Multiple Choice Questions

[MHT-CET 2022] (online - shift)

1. The vector equation of plane containing the point $(1, -1, 2)$ and perpendicular to planes $2x + 3y - 2z = 5$ and $x + 2y - 3z = 8$ is

a) $\bar{r}\cdot(-5i + 4j - k) = -7$ b) $r\cdot(-5i + 4j - k) = 7$

c) $\bar{r}\cdot(-5i + 4j + k) = -7$ d) $\bar{r}\cdot(-5i + 4j + k) = 7$

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

a) $\cos^{-1}\left(\frac{5}{9}\right)$ b) $\cos^{-1}\left(\frac{1}{9}\right)$ c) $\cos^{-1}\left(\frac{2}{9}\right)$ d) $\cos^{-1}\left(\frac{4}{9}\right)$

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

a) 2 units   b) $\sqrt{3}$ units   c) 1 unit   d) $\sqrt{2}$ units

4. A plane is parallel to two lines whose direction ratios are $(1, 0, -1)$ and $(-1, 1, 0)$ and it contains the point $(1, 1, 1)$. If it cuts the co-ordinate axes at A, B, C then the volume of tetrahedron OABC is .... c.u., Unit

a) 27   b) 9   c) $\frac{9}{2}$ d) $\frac{9}{4}$

5. The acute angle between the lines $x = -y, z = 0$ and $x = 0, z = 0$ is

a) $\frac{\pi}{4}$ b) $\frac{\pi}{3}$ c) $\frac{\pi}{6}$ d) $\frac{\pi}{18}$

6. 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) 4   b) 7   c) -7 d) no real value

7. The length of the perpendicular from the point $(0, 2, 3)$ on the line $\frac{x+3}{5} = \frac{y-1}{2} = \frac{z+4}{3}$, is

a) $\sqrt{15}$ units   b) $\sqrt{11}$ units   c) $\sqrt{21}$ units   d) $\sqrt{33}$ units

8. If P $(3, 2, 6)$ is a point in space and Q is a point on the line $\bar{r} = (i - j + 2k) + \mu(-3i + j + 5k)$, then the value of μ for which the vector PQ is parallel to the plane $x - 4y + 3z = 1$ is

a) $-\frac{1}{8}$ b) $\frac{1}{4}$ c) $-\frac{1}{4}$ d) $\frac{1}{8}$

9. The cartesian equation of the line passing through the point $(-3, 0, 1)$ and perpendicular to vectors $i - 2j + k$ and $2i + j - k$ is

a) $\frac{x+3}{-1} = \frac{y}{3} = \frac{z-1}{5}$ b) $\frac{x+3}{1} = \frac{y}{3} = \frac{z-1}{-5}$ c) $\frac{x+3}{1} = \frac{y}{-3} = \frac{z-1}{5}$ d) $\frac{x+3}{1} = \frac{y}{3} = \frac{z-1}{5}$

18. The co-ordinates of the foot of the perpendicular drawn from the origin to the plane $2x + y - 2z = 18$ are

a) $(4, 2, -4)$ b) $(1, 2, -3)$ c) $(4, 2, 4)$ d) $(4, -2, -4)$

19. If the lines $\frac{x-1}{2} = \frac{y+1}{3} = \frac{z-1}{4}$ and $\frac{x-2}{1} = \frac{y+m}{2} = \frac{z-2}{1}$ intersect each other, then value of m is

a) 1 b) -2 c) 2 d) -1

20. If the lines $\frac{2x-4}{\lambda} = \frac{y-1}{2} = \frac{z-3}{1}$ and $\frac{x-1}{1} = \frac{3y-1}{\lambda} = \frac{z-2}{1}$ are perpendicular to each other, then $\lambda =$

a) $\frac{-7}{6}$ b) $\frac{6}{7}$ c) $\frac{-6}{7}$ d) $\frac{7}{6}$

[MHT-CET 2020] (online)

21. The angle between the line $\frac{x-1}{2} = \frac{y+3}{1} = \frac{z+7}{2}$ and the plane $\bar{r}\,(6i - 2j - 3k) = 5$ is

a) $\cos^{-1}\left(\frac{4}{21}\right)$ b) $\sin^{-1}\left(\frac{4}{21}\right)$ c) $\sin^{-1}\left(\frac{5}{7}\right)$ d) $\cos^{-1}\left(\frac{5}{7}\right)$

22. If O = (0, 0, 0), P = $(1, \sqrt{2}, 1)$ then the acute angles made by the line OP with XOY, YOZ, ZOX planes are

a) 30°, 45°, 30° b) 45°, 45°, 60° c) 45°, 60°, 30° d) 60°, 45°, 60°

23. The distance of a point $(1, 2, -1)$ from the plane $x - 2y + 4z + 10 = 0$ is

a) $\frac{\sqrt{3}}{7}$ units b) $\sqrt{\frac{7}{3}}$ units c) $\frac{3}{\sqrt{7}}$ units d) $\sqrt{\frac{3}{7}}$ units

24. The point P lies on the line AB, where A = (2, 4, 5) and B = (1, 2, 3) If Z co-ordinate of point P is 3, then the Y co-ordinate is

a) -2 b) -3 c) 2 d) 3

25. If the lines $\frac{x-1}{-3} = \frac{y-2}{2k} = \frac{z-3}{2}$ and $\frac{x-1}{3k} = \frac{y-5}{1} = \frac{z-6}{-5}$ are perpendicular to each other, then k is

a) $\frac{7}{10}$ b) $\frac{-10}{7}$ c) $\frac{10}{7}$ d) $\frac{-7}{10}$

26. The unit vector perpendicular to the plane $4x - 3y + 12z = 15$ is

a) $\frac{4i-3j+12k}{5}$ b) $\frac{-4i-3j+12k}{13}$ c) $\frac{4i+3j+12k}{13}$ d) $\frac{-4i+3j+12k}{13}$

27. If the lines $\frac{1-x}{2} = \frac{y-8}{\lambda} = \frac{z-5}{2}$ and $\frac{x-11}{5} = \frac{y-3}{3} = \frac{z-1}{1}$ are perpendicular then $\lambda =$

a) $\frac{8}{3}$ b) 4 c) $-\frac{8}{3}$ d) -4

28. If the direction cosines of lines are $\frac{1}{c}, \frac{1}{c}, \frac{1}{c}$ then

a) $c = \pm \sqrt{3}$ b) $2 < c < 3$ c) $c = \pm \frac{1}{\sqrt{3}}$ d) $c = \pm 3$

29. The distance of the point (2, –1, 0) from the plane $2x + y + 2z + 8 = 0$ is

a) $\frac{11}{3}$ units b) $\frac{13}{3}$ units c) $\frac{17}{3}$ units d) $\frac{7}{3}$ units

30. The parametric equations of the line passing through the points A (3, 4, – 7) and B (1, –1, 6) are

a) $x = 3 + \lambda, y = -1 + 4\lambda, z = -7 + 6\lambda$ b) $x = 1 + 3\lambda, y = -1 + 4\lambda, z = 6 - 7\lambda$

c) $x = -2 + 3\lambda, y = -5 + 4\lambda, z = 13 - 7\lambda$ d) $x = 3 - 2\lambda, y = 4 - 5\lambda, z = -7 + 13\lambda$

[MHT-CET 2019]

31. The co-ordinates of the foot of perpendicular drawn from origin to the plane $2x - y + 5z - 3 = 0$ are

a) $\left(\frac{1}{5}, \frac{-1}{10}, \frac{1}{2}\right)$ b) (2, –1, 5) c) $\left(\frac{2}{3}, \frac{-1}{3}, \frac{5}{3}\right)$ d) $\left(\frac{2}{\sqrt{30}}, \frac{-1}{\sqrt{30}}, \frac{5}{\sqrt{30}}\right)$

32. The angle between lines $\frac{x-2}{2} = \frac{y-3}{-2} = \frac{z-5}{1}$ and $\frac{x-2}{1} = \frac{y-3}{2} = \frac{z-5}{2}$ is

a) 90° b) 45° c) 30° d) 60°

33. If P (6, 10, 10), Q (1, 0, – 5), R (6, –10, λ) are vertices of a triangle right angled at Q, then $\lambda =$

a) 3 b) 0 c) 1 d) 2

34. If the vectors $xi - 3j + 7k$ and $i + yj - zk$ are collinear, then the value of $\frac{xy^2}{z}$ is equal to

a) $\frac{9}{7}$ b) $\frac{7}{9}$ c) $\frac{-7}{9}$ d) $\frac{-9}{7}$

35. Which of the following cannot be the direction cosine of a line ?

a) $\sqrt{\frac{1}{5}}, -\sqrt{\frac{1}{2}}, \sqrt{\frac{3}{10}}$ b) $\frac{1}{\sqrt{2}}, \frac{-1}{\sqrt{2}}, 0$ c) $\frac{1}{\sqrt{2}}, \frac{-1}{\sqrt{2}}, -\frac{1}{\sqrt{2}}$ d) $\frac{1}{\sqrt{3}}, \frac{-1}{\sqrt{3}}, \frac{1}{\sqrt{3}}$

36. If lines $\frac{2x-4}{\lambda} = \frac{y-1}{2} = \frac{z-3}{1}$ and $\frac{x-1}{1} = \frac{3y-1}{\lambda} = \frac{z-2}{1}$ are perpendicular to each other then $\lambda =$

a) 6 b) $\frac{-7}{6}$ c) 7 d) $\frac{-6}{7}$

37. 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 $\sin\theta = \frac{1}{3}$, then the value of λ is

a) $\frac{-3}{5}$ b) $\frac{-5}{3}$ c) $\frac{5}{3}$ d) $\frac{3}{5}$

38. If the points $(1, 1, \lambda)$ and $(-3, 0, 1)$ are equidistant from the plane $\bar{r}\cdot(3i + 4j - 12k) = -13$ then $\lambda =$

a) ± 8 b) ± 13 c) 0 d) $\frac{7}{3}$ or 1

39. If line $\bar{r} = \bar{a} + \lambda \bar{b}$ is parallel to the plane $\bar{r} \cdot \bar{n} = p$ then

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

40. Points on the line $\frac{x}{2} = \frac{y}{3} = \frac{z}{6}$, which are at 7 unit distance from the origin are

a) (0, 0, 7) and (7, 0, 0)
b) (2, 3, 6) and (−2, −3, − 6)
c) (− 7, 0, 0) and (7, 0, 0)
d) (−2, 3, 6) and (2, − 3, 6)

[MHT-CET 2018]

41. If points P $(4, 5, x)$, Q $(3, y, 4)$ and R $(5, 8, 0)$ are collinear, then the value of $x + y$ is

a) − 4 b) 3 c) 5 d) 4

42. If a line makes angles 120° and 60° with the positive directions of x and z axes respectively then the angle made by the line with positive Y – axis is

a) 150° b) 60° c) 135° d) 120°

43. The equation of line passing through (3, −1, 2) and perpendicular to the lines $\bar{r} = (i + j - k) + \lambda (2i - 2j + k)$ and $\bar{r} = (2i + j - 3k) + \mu (i - 2j + 2k)$ is

a) $\frac{x+3}{2} = \frac{y+1}{3} = \frac{z-2}{2}$
b) $\frac{x-3}{3} = \frac{y+1}{2} = \frac{z-2}{2}$
c) $\frac{x-3}{2} = \frac{y+1}{3} = \frac{z-2}{2}$
d) $\frac{x-3}{2} = \frac{y+1}{2} = \frac{z-2}{3}$

44. 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) $\frac{9}{2}$ b) $\frac{1}{2}$ c) $\frac{5}{2}$ d) $\frac{7}{2}$

45. If planes $x - cy - bz = 0$, $cx - y + az = 0$ and $bx + ay - z = 0$ pass through a straight line, then $a^2 + b^2 + c^2 =$

a) $1 - abc$ b) $abc - 1$ c) $1 - 2\,abc$ d) $2\,abc - 1$

46. If planes $\bar{r} . (pi - j + 2k) + 3 = 0$ and $\bar{r} \cdot (2i - pj - k) - 5 = 0$ include angle $\frac{\pi}{3}$, then the value of p is

a) (1, − 3) b) (− 1, 3) c) − 3 d) 3

[MHT-CET 2017]

47. The equation of line equally inclined to co-ordinate axes and passing through (−3, 2, −5) is

a) $\frac{x+3}{2} = \frac{y-2}{1} = \frac{z+5}{1}$
b) $\frac{x+3}{-1} = \frac{y-2}{1} = \frac{5+z}{-1}$
c) $\frac{x+3}{-1} = \frac{y-2}{1} = \frac{z+5}{1}$
d) $\frac{x+3}{-1} = \frac{2-y}{1} = \frac{z+5}{-1}$

132. Equation of the plane passing the point (1, 1, 1) and perpendicular to the planes $2x - y - 2z = 5$ and $3x - 6y + 2z = 7$ is

a) $14x + 10y + 9z = 33$
b) $14x + 10y + 9z = 13$
c) $14x + 10y + 9z = -33$
d) $14x + 10y + 9z = -15$

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

a) $x - 2y - z = 0$
b) $x - 2y + z = 0$
c) $x + 2y - z = 0$
d) $x + 2y + z = 0$

134. The equation of plane passing through the line of intersection of planes $x + y + z = 1$, $2x + 3y - z + 4 = 0$ and parallel to y-axis is

a) $x + 4z - 1 = 0$
b) $x + 4z - 7 = 0$
c) $x - 4z + 1 = 0$
d) $x - 4z + 7 = 0$

135. The vector 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 $x - y + z = 0$ is

a) $\bar{r} \cdot \left(\hat{i} - \hat{k}\right) = 2$
b) $\bar{r} \cdot \left(\hat{i} - \hat{k}\right) = -2$
c) $\bar{r} \cdot \left(\hat{i} + \hat{k}\right) = -2$
d) $\bar{r} \cdot \left(\hat{i} + \hat{k}\right) = 2$

136. The plane $2x + 3y + 4z = 1$ meets coordinates axes at A, B, C respectively. Then the centriod of Δ ABC is

a) (2, 3, 4)
b) $\left(\frac{1}{2}, \frac{1}{3}, \frac{1}{4}\right)$
c) $\left(\frac{3}{2}, \frac{3}{3}, \frac{3}{4}\right)$
d) $\left(\frac{1}{6}, \frac{1}{9}, \frac{1}{12}\right)$

137. The Cartesian equation of the plane passing through the points (3, 1, 1), (1, 2, 3) and (−1, 4, 2) is

a) $5x + 6y + 2z - 23 = 0$
b) $5x + 6y - 2z - 23 = 0$
c) $5x - 6y + 2z - 23 = 0$
d) $-5x + 6y + 2z + 23 = 0$

138. 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 $\alpha\beta =$

a) -42
b) -2
c) 1
d) 42

139. If the line $\frac{x-3}{2} = \frac{y+2}{-1} = \frac{z+4}{3}$ lies in the plane $lx + my - z = 9$, then $l^2 + m^2 =$

a) 26
b) 18
c) 5
d) 2

140. Let the vectors $\bar{a}, \bar{b}, \bar{c}$ and $\bar{d}$ be such that $\left(\bar{a} \times \bar{b}\right) \times \left(\bar{c} \times \bar{d}\right) = 0$. Let P_1 and P_2 be the planes determined by the pair of vectors $\bar{a}, \bar{b}$ and $\bar{c}, \bar{d}$ respectively, then the angle between planes P_1 and P_2 is

a) 0
b) $\frac{\pi}{4}$
c) $\frac{\pi}{3}$
d) $\frac{\pi}{2}$

141. If P (2, 3, 6) is a point in space and Q is a point on the line $r = \left(\hat{i} - \hat{j} + 2\hat{k}\right) + \lambda\left(-3\hat{i} + \hat{j} + 5\hat{k}\right)$, then the value of λ for which the vector $\overline{PQ}$ is parallel to the plane $x - 4y + 4z = 1$, is

a) $-\frac{6}{13}$
b) $-\frac{1}{13}$
c) $\frac{6}{13}$
d) $\frac{1}{13}$

142. 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) $\frac{2}{3}$
b) $\sqrt{\frac{2}{3}}$
c) $\frac{2}{\sqrt{3}}$
d) $\frac{\sqrt{2}}{3}$

153. Let Q be the image of the point P (3, 1, 7) with respect to the plane $x - y + z = 3$. Then the equation of the plane passing through Q and containing the straight line $\frac{x}{1} = \frac{y}{2} = \frac{z}{1}$ is

a) $x + 4y + 7z = 0$ b) $x - 4y + 7z = 0$ c) $x - 4y - 7z = 0$ d) $-x - 4y + 7z = 0$

154. Let P be the plane passing through the points (2, 1, 0), (4, 1, 1) and (5, 0, 1) and R be the point (2, 1, 6). Then image of R in the plane P is

a) (4, 3, 2) b) (6, 5, 2) c) (3, 4, – 2) d) (6, 5, – 2)

155. 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

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

[MHT - CET 2025]

156. If the lines $\frac{3-x}{2} = \frac{5y-2}{3\lambda+1} = 5 - z$ and $\frac{x+2}{-1} = \frac{1-3y}{7} = \frac{4-z}{2\mu}$ are at right angles, then $7\lambda - 10\mu =$

a) 23 b) 37 c) $\frac{23}{3}$ d) $\frac{37}{3}$

157. The acute angle between the lines $x = -2 + 2t$, $y = 3 - 4t$, $z = -4 + t$, and $x = -2 - t$, $y = 3 + 2t$, $z = -4 + 3t$ is

a) $\cos^{-1}\left(\frac{1}{\sqrt{6}}\right)$ b) $\cos^{-1}\left(\frac{1}{\sqrt{5}}\right)$ c) $\cos^{-1}\left(\frac{2}{\sqrt{6}}\right)$ d) $\cos^{-1}\left(\frac{2}{\sqrt{5}}\right)$

158. The distance of the point (– 3, 2, 3) from the line passing through (4, 6, – 2) and having direction ratios – 1, 2, 3 is

a) $4\sqrt{17}$ b) $2\sqrt{17}$ c) $2\sqrt{19}$ d) $4\sqrt{19}$

159. If the shortest distance between the lines $\frac{x-k}{2} = \frac{y-4}{3} = \frac{z-3}{4}$ and $\frac{x-2}{4} = \frac{y-4}{6} = \frac{z-7}{8}$ is $\frac{13}{\sqrt{29}}$ units, then k is

a) 1 b) – 1 c) 2 d) – 2

160. The direction cosines of the line of intersection of the planes $x - y + 2z = 5$ and $3x + y + z = 6$ 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) $\frac{3}{5\sqrt{2}}, \frac{5}{5\sqrt{2}}, -\frac{4}{5\sqrt{2}}$

161. The Cartesian equation of the plane passing through the point (7, 8, 6) and parallel to xy-plane is

a) $x = 7$ b) $y = 8$ c) $z = 1$ d) $z = 6$