# 3D

**1.** The angle between two diagonals of a cube will be

(a) $\sin^{-1}\frac{1}{3}$ (b) $\cos^{-1}\frac{1}{3}$ (c) Constant (d) Variable

**2.** If a line makes angles $\alpha, \beta, \gamma, \delta$ with the four diagonals of a cube, then the value of $\cos^2\alpha + \cos^2\beta + \cos^2\gamma + \cos^2\delta =$

(a) 1 (b) $\frac{4}{3}$ (c) Constant (d) Variable

**3.** The equation of the line passing through the point (1, 2, –4) and perpendicular to the two lines $\frac{x-8}{2} = \frac{y+19}{-16} = \frac{z-10}{7}$ and $\frac{x-15}{-2} = \frac{y-29}{8} = \frac{z-5}{-5}$, will be

(a) $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z+4}{6}$ (b) $\frac{x-1}{-2} = \frac{y-2}{3} = \frac{z+4}{8}$ (c) $\frac{x-1}{3} = \frac{y-2}{2} = \frac{z+4}{8}$ (d) None of these

**4.** The equation of straight line $3x + 2y - z - 4 = 0$ ; $4x + y - 2z + 3 = 0$ in the symmetrical form is

(a) $\frac{x-2}{3} = \frac{y-5}{2} = \frac{z}{5}$ (b) $\frac{x+2}{3} = \frac{y-5}{-2} = \frac{z}{5}$ (c) $\frac{x+2}{3} = \frac{y-5}{2} = \frac{z}{5}$ (d) None of these

**5.** If $l_1, m_1, n_1$ and $l_2, m_2, n_2$ are the direction ratios of two intersecting lines, then the direction ratios of lines through them and coplanar with them are given by

(a) $l_1 + km_1, l_2 + km_2, l_3 + km_3$ (b) $kl_1l_2, km_1m_2, kn_1n_2$

(c) $l_1 + kl_2, m_1 + km_2, n_1 + kn_2$ (d) $\frac{kl_1}{l_2}, \frac{km_1}{m_2}, \frac{kn_1}{n_2}$, *k* being a number whatsoever

**6.** The four points (0, 4, 3), (–1, –5, –3), (–2, –2, 1) and (1, 1, –1) lie in the plane

(a) $4x + 3y + 2z - 9 = 0$ (b) $9x - 5y + 6z + 2 = 0$ (c) $3x + 4y + 7z - 5 = 0$ (d) None of these

**7.** A plane meets the coordinate axes at *A, B, C* such that the centre of the triangle is (3, 3, 3). The equation of the plane is

(a) $x + y + z = 3$ (b) $x + y + z = 9$ (c) $3x + 3y + 3z = 1$ (d) $9x + 9y + 9z = 1$

**8.** Perpendicular is drawn from the point (0, 3, 4) to the plane $2x - 2y + z = 10$. The coordinates of the foot of the perpendicular are

(a) $(-8/3, 1/3, 16/3)$ (b) $(8/3, 1/3, 16/3)$ (c) $(8/3, -1/3, 16/3)$ (d) $(8/3, 1/3, -16/3)$

**9.** The equation of the plane containing the lines $\mathbf{r} - \mathbf{a} = t\,\mathbf{b}$ and $\mathbf{r} - \mathbf{b} = s\,\mathbf{a}$ is

(a) $\mathbf{r}\,.\,\mathbf{a} = \mathbf{a}\,.\,\mathbf{b}$ (b) $[\mathbf{r}\ \mathbf{a}\ \mathbf{b}] = 0$ (c) $\mathbf{r}\,.\,\mathbf{a} = \mathbf{r}\,.\,\mathbf{b}$ (d) $\mathbf{r}\,.\,\mathbf{b} = \mathbf{a}\,.\,\mathbf{b}$

**10.** A straight line passes through the point (2, –1, –1). It is parallel to the plane $4x + y + z + 2 = 0$ and is perpendicular to the line $x/1 = y/(-2) = (z-5)/1$. The equation of the straight line are

(a) $(x-2)/4 = (y+1)/1 = (z+1)/1$ (b) $(x+2)/4 = (y-1)/1 = (z-1)/3$

(c) $(x-2)/(-1) = (y+1)/1 = (z+1)/3$ (d) $(x+2)/(-1) = (y-1)/1 = (z-1)/3$

**11.** The equations of the projection of the line $\frac{x-1}{2} = \frac{y-2}{1} = \frac{z-3}{3}$ on the plane $x + y + z - 1 = 0$ are

(a) $x + y + z - 1 = 0 = 2x - y - z + 3$ (b) $x + y - z - 1 = 0 = x + 2y - z - 3$

(c) $2x - y + 3z - 1 = 0 = x + y + z + 1$ (d) $x + 2y - 3z = 0 = x + y + z + 1$

**12.** The points on the line $\frac{x+1}{1} = \frac{y+3}{3} = \frac{z-2}{-2}$ distant $\sqrt{(14)}$ from the point in which the line meets the plane $3x + 4y + 5z - 5 = 0$ are

(a) (0, 0, 0), (2, –4, 6) (b) (0, 0, 0), (3, –4, –5) (c) (0, 0, 0), (2, 6, –4) (d) (2, 6, –4), (3, –4, –5)

**13.** The line $\frac{x+1}{-1} = \frac{y-12}{5} = \frac{z-7}{2}$ cuts the surface $11x^2 - 5y^2 + z^2 = 0$ in the point

(a) (1, 1, 1) and (1, 2, 3) (b) (1, –1, 2) and (1, 2, 4) (c) (1, 2, 3) and (2, –3, 1) (d) None of these

**14.** The equation of the sphere circumscribing the tetrahedron whose faces are $x = 0, y = 0, z = 0$ and $x/a + y/b + z/c = 1$ is

(a) $x^2 + y^2 + z^2 = a^2 + b^2 + c^2$

(b) $x^2 + y^2 + z^2 - ax - by - cz = 0$

(c) $x^2 + y^2 + z^2 - 2ax - 2by - 2cz = 0$

(d) None of these

**15.** Radius of the circle $\mathbf{r}^2 + \mathbf{r}\cdot(2\mathbf{i} - 2\mathbf{j} - 4\mathbf{k}) - 19 = 0$, $\mathbf{r}.(\mathbf{i} - 2\mathbf{j} + 2\mathbf{k}) + 8 = 0$ is

(a) 2 (b) 3 (c) 4 (d) 5