1. P is a fixed point (a, a, a) on a line through the origin equally inclined to the axes, then any plane through P perpeneicular to OP, makes intercepts on the axes, then sum of whose reciprocals is equal to-

(1) a (2) $\frac{3}{2a}$

(3) $\frac{1}{a}$ (4) None of these

2. The distance between two points P and Q is d and the length of their projections of PQ on the co-ordinate planes are d_1, d_2, d_3. Then $d_1^2 + d_2^2 + d_3^2 = kd^2$ where 'k' is-

(1) 1 (2) 5 (3) 3 (4) 2

3. The position vectors of two points P and Q are $3\mathbf{i} + \mathbf{j} + 2\mathbf{k}$ and $\mathbf{i} - 2\mathbf{j} - 4\mathbf{k}$ respectively. The equation of the plane through Q and perpendicular to PQ is-

(1) $\mathbf{r}.(2\mathbf{i} + 3\mathbf{j} + 6\mathbf{k}) = 28$

(2) $\mathbf{r}.(2\mathbf{i} + 3\mathbf{j} + 6\mathbf{k}) = 32$

(3) $\mathbf{r}.(2\mathbf{i} + 3\mathbf{j} + 6\mathbf{k}) + 28 = 0$

(4) None of these

4. The shortest distance between the lines $\mathbf{r} = (3\mathbf{i} - 2\mathbf{j} - 2\mathbf{k}) + \mathbf{i}t$ and $\mathbf{r} = \mathbf{i} - \mathbf{j} + 2\mathbf{k} + \mathbf{j}s$ (t and s being parameters) is-

(1) $\sqrt{21}$ (2) $\sqrt{102}$

(3) 4 (4) 3

5. The four lines drawn from the vertices of any tetrahedron to the centroid of the opposite faces meet in a point whose distance from each vertex is k times the distance from each vertex to the opposite face, where k is -

(1) 1/3 (2) 1/2

(3) 3/4 (4) 5/4

6. The reflection of the point (2, –1, 3) in the plane $3x - 2y - z = 9$ is -

(1) $\left(\frac{26}{7}, \frac{15}{7}, \frac{17}{7}\right)$ (2) $\left(\frac{26}{7}, -\frac{15}{7}, \frac{17}{7}\right)$

(3) $\left(\frac{15}{7}, \frac{26}{7}, \frac{-17}{7}\right)$ (4) $\left(\frac{26}{7}, \frac{17}{7}, \frac{-15}{7}\right)$

7. The equation of the plane through the point (–1, 2, 0) and parallel to the lines $\frac{x}{3} = \frac{y+1}{0} = \frac{z-2}{-1}$ and $\frac{x-1}{1} = \frac{2y+1}{2} = \frac{2z+1}{-1}$

(1) $2x + 3y + 6z - 4 = 0$

(2) $x - 2y + 3z + 5 = 0$

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

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

8. Through a point P(f, g, h) a plane is drawn at right angles to OP, to meet the axes in A, B, C. If OP = r, then centroid of the triangle ABC is-

(1) $\left(\frac{f}{3r}, \frac{g}{3r}, \frac{h}{3r}\right)$ (2) $\left(\frac{r^2}{3f^2}, \frac{r^2}{3g^2}, \frac{r^2}{3h^2}\right)$

(3) $\left(\frac{r^2}{3f}, \frac{r^2}{3g}, \frac{r^2}{3h}\right)$ (4) None of these

9. In a three dimentional co-ordinate system P, Q and R are the images of a point A(a, b, c) in xy, yz and zx planes respectively. If G is the centroid of triangle PQR, then area of triangle AOG is (O is the origin)

(1) 0 (2) $a^2 + b^2 + c^2$

(3) $\frac{2}{3}(a^2 + b^2 + c^2)$ (4) None of these

10. The projections of a line on the axes are 9, 12,8 the length of the line is

(1) 7 (2) 17

(3) 21 (4) 25

11. The angle between any two diagonals of a cube is

(1) $\cos\theta = \sqrt{3}/2$ (2) $\cos\theta = 1/\sqrt{2}$

(3) $\cos\theta = 1/3$ (4) $\cos\theta = 1/\sqrt{6}$

12. A straight line is given by $\vec{r} = (1+t)\hat{i} + 3t\hat{j} + (1-t)\hat{k}$ where $t \in R$. If this line lies in the plane $x+y+cz=d$ then the value of (c + d) is

(1) 9 (2) 1

(3) –1 (4) 7

13. If a line makes angles $\alpha, \beta, \gamma, \delta$ with the diagonals of a cube then which of the following statement is incorrect ?

(1) $\cos^2\alpha + \cos^2\beta + \cos^2\gamma + \cos^2\delta = \frac{4}{3}$

(2) $\sin^2\alpha + \sin^2\beta + \sin^2\gamma + \sin^2\delta = \frac{8}{3}$

(3) $\cos2\alpha + \cos2\beta + \cos2\gamma + \cos2\delta = \frac{-4}{3}$

(4) None of these

14. The value of m for which straight line $3x - 2y + z + 3 = 0 = 4x - 3y + 4z + 1$ is parallel to the plane $2x - y + mz - 2 = 0$ is

(1) –2 (2) 8

(3) –18 (4) 11

15. Sum of the length intercepts on axes of the plane $\vec{r} = \hat{i} + \hat{j} + \lambda(\hat{i} + \hat{j} + \hat{k}) + \mu(\hat{i} - 2\hat{j} + 3\hat{k})$ is

(1) 0 (2) 3 (3) $\frac{31}{10}$ (4) $\frac{31}{30}$

16. 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

(1) k = 0 or –1 (2) k = 1 or –1

(3) k = 0 or –3 (4) k = 3 or –3

17. The equation of right bisector plane of the segment joining (2, 3, 4) and (6, 7, 8) is

(1) x + y + z + 15 = 0

(2) x + y + z – 15 = 0

(3) x – y + z – 15 = 0

(4) None of these

18. If sum of two unit vectors is a unit vector then find the magnitude of their difference :-

(1) 1 (2) 0

(3) Data not sufficient (4) None

19. Find the value of K if line $\frac{x-2}{3} = \frac{y-1}{4} = z$ plane $3x + 2y + kz + 5 = 0$ are parallel :-

(1) 17 (2) –9

(3) –8 (4) None

20. If the line $\frac{x-3}{2} = \frac{y-4}{3} = \frac{z-5}{4}$ lies in the plane $4x + 4y - kz - d = 0$ then :-

(1) k = 3 (2) k = 2

(3) k = 1 (4) k = 5

21. Projection of the line segment joining the points (–1, 0, 3) and (2, 5, 1) on the line whose Dr's are 6, 2, 1 :-

(1) $\frac{7}{22}$ (2) $\frac{22}{7}$ (3) $\frac{11}{7}$ (4) $\frac{7}{11}$

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

(1) 1 (2) 2 (3) $\frac{1}{2}$ (4) 4

23. The angle between lines $3x + 2y + z = 0 = x + y - 2z$ and $2x - y - z = 0 = 7x + 10y - 8z$ is :-

(1) $\frac{\pi}{6}$ (2) $\frac{\pi}{2}$ (3) $\frac{\pi}{3}$ (4) 0

24. The equation of line $x + y + z - 1 = 0 = 4x + y - 2z + 2$ written in the symmetrical form is : where

(A) $\equiv \frac{x+1}{1} = \frac{y-2}{-2} = \frac{z-0}{1}$

(B) $\equiv \frac{x}{1} = \frac{y}{-2} = \frac{z-1}{1}$

(C) $\frac{x+1/2}{1} = \frac{y-1}{-2} = \frac{z-1/2}{1}$

(1) (A) and (B) (2) (B) and (C)

(3) (A) and (C) (4) (A), (B) and (C)

25. A plane passes through the point P(4, 0, 0) and Q(0, 0, 4) and is parallel to the y-axis. The distance of the plane from the origin is

(1) 2 (2) 4

(3) $\sqrt{2}$ (4) $2\sqrt{2}$

26. If the plane $2x - 3y + 6z - 11 = 0$ makes an angle $\sin^{-1}(k)$ with x-axis, then k is equal to

(1) $\sqrt{3}/2$ (2) 2/7

(3) $\sqrt{2}/3$ (4) 1

27. The value of 'a' for which the lines

$$\frac{x-2}{1}=\frac{y-9}{2}=\frac{z-13}{3} \text{ and } \frac{x-a}{-1}=\frac{y-7}{2}=\frac{z+2}{-3}$$

intersect, is

(1) – 5 (2) – 2

(3) 5 (4) – 3

28. For the line $\frac{x-1}{1}=\frac{y-2}{2}=\frac{z-3}{3}$, which one of the following is incorrect?

(1) it lies in the plane $x - 2y + z = 0$

(2) it is same as line $\frac{x}{1}=\frac{y}{2}=\frac{z}{3}$

(3) it passes through (2, 3, 5)

(4) it is parallel to the plane $x - 2y + z - 6 = 0$

29. The line $\frac{x-x_1}{0}=\frac{y-y_1}{1}=\frac{z-z_1}{2}$ is

(1) parallel to x-axis

(2) perpendicular to x-axis

(3) perpendicular to YOZ plane

(4) parallel to y-axis

30. 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

(1) $2\sqrt{11}$ (2) $\sqrt{126}$

(3) 13 (4) 14

ANSWER KEY Exercise-I

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	**3**	**4**	**1**	**3**	**3**	**2**	**4**	**3**	**1**	**2**
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	**3**	**4**	**4**	**1**	**3**	**3**	**2**	**4**	**4**	**4**
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	**2**	**1**	**2**	**4**	**4**	**2**	**4**	**3**	**2**	**3**