EXERCISE-I

Modulus of vector, Algebra of vectors

1. If the position vectors of A and B are $\mathbf{i}+3\mathbf{j}-7\mathbf{k}$ and $5\mathbf{i}-2\mathbf{j}+4\mathbf{k}$, then the direction cosine of $\overrightarrow{AB}$ along y-axis is

(A) $\frac{4}{\sqrt{162}}$ (B) $-\frac{5}{\sqrt{162}}$

(C) – 5 (D) 11

2. If the resultant of two forces is of magnitude P and equal to one of them and perpendicular to it, then the other force is

(A) $P\sqrt{2}$ (B) P

(C) $P\sqrt{3}$ (D) None of these

3. The direction cosines of vector $\mathbf{a}=3\mathbf{i}+4\mathbf{j}+5\mathbf{k}$ in the direction of positive axis of x, is

(A) $\pm\frac{3}{\sqrt{50}}$ (B) $\frac{4}{\sqrt{50}}$

(C) $\frac{3}{\sqrt{50}}$ (D) $-\frac{4}{\sqrt{50}}$

4. The point having position vectors $2\mathbf{i}+3\mathbf{j}+4\mathbf{k}$, $3\mathbf{i}+4\mathbf{j}+2\mathbf{k}$, $4\mathbf{i}+2\mathbf{j}+3\mathbf{k}$ are the vertices of

(A) Right angled triangle (B) Isosceles triangle

(C) Equilateral triangle (D) Collinear

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

(A) Are collinear

(B) Form an equilateral triangle

(C) Form a scalene triangle

(D) Form a right angled triangle

6. If $|\mathbf{a}|=3$, $|\mathbf{b}|=4$ and $|\mathbf{a}+\mathbf{b}|=5$, then $|\mathbf{a}-\mathbf{b}|=$

(A) 6 (B) 5

(C) 4 (D) 3

7. If $OP = 8$ and $\overrightarrow{OP}$ makes angles 45° and 60° with OX-axis and OY-axis respectively, then $\overrightarrow{OP}=$

(A) $8(\sqrt{2}\mathbf{i}+\mathbf{j}\pm\mathbf{k})$ (B) $4(\sqrt{2}\mathbf{i}+\mathbf{j}\pm\mathbf{k})$

(C) $\frac{1}{4}(\sqrt{2}\mathbf{i}+\mathbf{j}\pm\mathbf{k})$ (D) $\frac{1}{8}(\sqrt{2}\mathbf{i}+\mathbf{j}\pm\mathbf{k})$

8. If **a** and **b** are two non-zero and non-collinear vectors, then **a** + **b** and **a** – **b** are

(A) Linearly dependent vectors

(B) Linearly independent vectors

(C) Linearly dependent and independent vectors

(D) None of these

9. If the vectors $6\mathbf{i}-2\mathbf{j}+3\mathbf{k}, 2\mathbf{i}+3\mathbf{j}-6\mathbf{k}$ and $3\mathbf{i}+6\mathbf{j}-2\mathbf{k}$ form a triangle, then it is

(A) Right angled (B) Obtuse angled

(C) Equilteral (D) Isosceles

10. If the resultant of two forces of magnitudes P and Q acting at a point at an angle of 60° is $\sqrt{7}Q$, then P/Q is

(A) 1 (B) $\frac{3}{2}$

(C) 2 (D) 4

11. If P and Q be the middle points of the sides BC and CD of the parallelogram $ABCD$, then $\overrightarrow{AP}+\overrightarrow{AQ}=$

(A) $\overrightarrow{AC}$ (B) $\frac{1}{2}\overrightarrow{AC}$

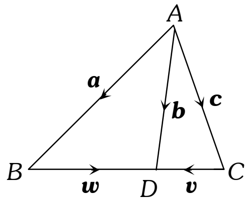
(C) $\frac{2}{3}\overrightarrow{AC}$ (D) $\frac{3}{2}\overrightarrow{AC}$

12. P is a point on the side BC of the ΔABC and Q is a point such that $\overrightarrow{PQ}$ is the resultant of $\overrightarrow{AP}, \overrightarrow{PB}, \overrightarrow{PC}$. Then $ABQC$ is a

(A) Square (B) Rectangle

(C) Parallelogram (D) Trapezium

13. In the figure, a vector $\mathbf{x}$ satisfies the equation $\mathbf{x}-\mathbf{w}=\mathbf{v}$. Then $\mathbf{x}=$



(A) $2\mathbf{a}+\mathbf{b}+\mathbf{c}$ (B) $\mathbf{a}+2\mathbf{b}+\mathbf{c}$
(C) $\mathbf{a}+\mathbf{b}+2\mathbf{c}$ (D) $\mathbf{a}+\mathbf{b}+\mathbf{c}$

14. A vector coplanar with the non-collinear vectors **a** and **b** is
(A) $\mathbf{a}\times\mathbf{b}$
(B) $l\neq 0,\ m\neq 0,\ n\neq 0$
(C) $\mathbf{a}.\mathbf{b}$
(D) None of these

15. If *ABCD* is a parallelogram, $\overrightarrow{AB}=2\mathbf{i}+4\mathbf{j}-5\mathbf{k}$ and $\overrightarrow{AD}=\mathbf{i}+2\mathbf{j}+3\mathbf{k}$, then the unit vector in the direction of *BD* is
(A) $\frac{1}{\sqrt{69}}(\mathbf{i}+2\mathbf{j}-8\mathbf{k})$ (B) $\frac{1}{69}(\mathbf{i}+2\mathbf{j}-8\mathbf{k})$
(C) $\frac{1}{\sqrt{69}}(-\mathbf{i}-2\mathbf{j}+8\mathbf{k})$ (D) $\frac{1}{69}(-\mathbf{i}-2\mathbf{j}+8\mathbf{k})$

16. If **a, b** and **c** be three non-zero vectors, no two of which are collinear. If the vector $\mathbf{a}+2\mathbf{b}$ is collinear with **c** and $\mathbf{b}+3\mathbf{c}$ is collinear with **a,** then (λ being some non-zero scalar) $\mathbf{a}+2\mathbf{b}+6\mathbf{c}$ is equal to
(A) $\lambda\mathbf{a}$ (B) $\lambda\mathbf{b}$
(C) $\lambda\mathbf{c}$ (D) $\mathbf{0}$

17. If $\mathbf{a}=2\mathbf{i}+5\mathbf{j}$ and $\mathbf{b}=2\mathbf{i}-\mathbf{j}$, then the unit vector along $y=0$ will be
(A) $\frac{\mathbf{i}-\mathbf{j}}{\sqrt{2}}$ (B) $ap+bq+cr=0$
(C) 90^{o} (D) $\frac{\mathbf{i}+\mathbf{j}}{\sqrt{2}}$

18. What should be added in vector $\mathbf{a}=3\mathbf{i}+4\mathbf{j}-2\mathbf{k}$ to get its resultant a unit vector **i**
(A) $-2\mathbf{i}-4\mathbf{j}+2\mathbf{k}$ (B) $-2\mathbf{i}+4\mathbf{j}-2\mathbf{k}$
(C) $2\mathbf{i}+4\mathbf{j}-2\mathbf{k}$ (D) None of these

19. If $\mathbf{a}=\mathbf{i}+2\mathbf{j}+3\mathbf{k}$, $\mathbf{b}=-\mathbf{i}+2\mathbf{j}+\mathbf{k}$ and $\mathbf{c}=3\mathbf{i}+\mathbf{j}$, then the unit vector along its resultant is
(A) $3\mathbf{i}+5\mathbf{j}+4\mathbf{k}$ (B) $\frac{3\mathbf{i}+5\mathbf{j}+4\mathbf{k}}{50}$
(C) $\frac{3\mathbf{i}+5\mathbf{j}+4\mathbf{k}}{5\sqrt{2}}$ (D) None of these

20. In a regular hexagon *ABCDEF*, $\overrightarrow{AE}=$
(A) $2\mathbf{a}-3\mathbf{b}$ (B) $\overrightarrow{AC}+\overrightarrow{AF}-\overrightarrow{AB}$
(C) $\overrightarrow{AC}+\overrightarrow{AB}-\overrightarrow{AF}$ (D) None of these

Scalar or Dot product of two vectors and its applications

21. If $|\mathbf{a}|=3$, $|\mathbf{b}|=4$ and the angle between **a** and **b** be 120^{o}, then $|4\mathbf{a}+3\mathbf{b}|=$
(A) 25 (B) 12
(C) 13 (D) 7

22. A vector whose modulus is $\sqrt{51}$ and makes the same angle with $\mathbf{a}=\frac{\mathbf{i}-2\mathbf{j}+2\mathbf{k}}{3}$, $\mathbf{b}=\frac{-4\mathbf{i}-3\mathbf{k}}{5}$ and $\mathbf{c}=\mathbf{j}$, will be
(A) $5\mathbf{i}+5\mathbf{j}+\mathbf{k}$ (B) $5\mathbf{i}+\mathbf{j}-5\mathbf{k}$
(C) $5\mathbf{i}+\mathbf{j}+5\mathbf{k}$ (D) $\pm(5\mathbf{i}-\mathbf{j}-5\mathbf{k})$

23. If **a**, **b**, **c** are coplanar vectors, then
(A) $\begin{vmatrix}\mathbf{a} & \mathbf{b} & \mathbf{c}\\ \mathbf{b} & \mathbf{c} & \mathbf{a}\\ \mathbf{c} & \mathbf{a} & \mathbf{b}\end{vmatrix}=\mathbf{0}$ (B) $\begin{vmatrix}\mathbf{a} & \mathbf{b} & \mathbf{c}\\ \mathbf{a.a} & \mathbf{a.b} & \mathbf{a.c}\\ \mathbf{b.a} & \mathbf{b.b} & \mathbf{b.c}\end{vmatrix}=\mathbf{0}$
(C) $\begin{vmatrix}\mathbf{a} & \mathbf{b} & \mathbf{c}\\ \mathbf{c.a} & \mathbf{c.b} & \mathbf{c.c}\\ \mathbf{b.a} & \mathbf{b.c} & \mathbf{b.b}\end{vmatrix}=\mathbf{0}$ (D) $\begin{vmatrix}\mathbf{a} & \mathbf{b} & \mathbf{c}\\ \mathbf{a.b} & \mathbf{a.a} & \mathbf{a.c}\\ \mathbf{c.a} & \mathbf{c.c} & \mathbf{c.b}\end{vmatrix}=\mathbf{0}$

24. If $\vec{\lambda}$ is a unit vector perpendicular to plane of vector **a** and **b** and angle between them is θ, then **a . b** will be
(A) $|\mathbf{a}||\mathbf{b}|\sin\theta\vec{\lambda}$ (B) $|\mathbf{a}||\mathbf{b}|\cos\theta\vec{\lambda}$
(C) $|\mathbf{a}||\mathbf{b}|\cos\theta$ (D) $|\mathbf{a}||\mathbf{b}|\sin\theta$

25. If $\mathbf{p}=\mathbf{i}-2\mathbf{j}+3\mathbf{k}$ and $\mathbf{q}=3\mathbf{i}+\mathbf{j}+2\mathbf{k}$, then a vector along **r** which is linear combination of **p** and **q** and also perpendicular to **q** is
(A) $\mathbf{i}+5\mathbf{j}-4\mathbf{k}$ (B) $\mathbf{i}-5\mathbf{j}+4\mathbf{k}$
(C) $-\frac{1}{2}(\mathbf{i}+5\mathbf{j}-4\mathbf{k})$ (D) None of these

26. If $\mathbf{d} = \lambda(\mathbf{a}\times\mathbf{b}) + \mu(\mathbf{b}\times\mathbf{c}) + \nu(\mathbf{c}\times\mathbf{a})$ and $[\mathbf{a}\,\mathbf{b}\,\mathbf{c}] = \frac{1}{8}$, then $\lambda+\mu+\nu$ is equal to

(A) $8\mathbf{d}.(\mathbf{a}+\mathbf{b}+\mathbf{c})$ (B) $8\mathbf{d}\times(\mathbf{a}+\mathbf{b}+\mathbf{c})$

(C) $\frac{\mathbf{d}}{8}.(\mathbf{a}+\mathbf{b}+\mathbf{c})$ (D) $\frac{\mathbf{d}}{8}\times(\mathbf{a}+\mathbf{b}+\mathbf{c})$

27. The horizontal force and the force inclined at an angle 60^o with the vertical, whose resultant is in vertical direction of *P kg,* are

(A) *P, 2P* (B) P, $P\sqrt{3}$

(C) 2P, $P\sqrt{3}$ (D) None of these

28. If **a** and **b** are mutually perpendicular vectors, then $(\mathbf{a}+\mathbf{b})^2 =$

(A) $\mathbf{a}+\mathbf{b}$ (B) $\mathbf{a}-\mathbf{b}$

(C) $a^2 - b^2$ (D) $(\mathbf{a}-\mathbf{b})^2$

29. $\mathbf{a}.\mathbf{b} = 0$, then

(A) $\mathbf{a}\perp\mathbf{b}$

(B) $\mathbf{a}\,||\,\mathbf{b}$

(C) Angle between **a** and **b** is 60^o

(D) None of these

30. If $|\mathbf{a}| = 3, |\mathbf{b}| = 1, |\mathbf{c}| = 4$ and $\mathbf{a}+\mathbf{b}+\mathbf{c} = \mathbf{0}$, then $\mathbf{a}.\mathbf{b}+\mathbf{b}.\mathbf{c}+\mathbf{c}.\mathbf{a} =$

(A) – 13 (B) – 10

(C) 13 (D) 10

31. If the position vectors of the points *A, B, C, D* be $\mathbf{i}+\mathbf{j}+\mathbf{k}$, $2\mathbf{i}+5\mathbf{j}$, $3\mathbf{i}+2\mathbf{j}-3\mathbf{k}$ and $\mathbf{i}-6\mathbf{j}-\mathbf{k}$, then the angle between the vectors $\overrightarrow{AB}$ and $\overrightarrow{CD}$ is

(A) $\frac{\pi}{4}$ (B) $\frac{\pi}{3}$

(C) $\frac{\pi}{2}$ (D) π

32. If θ be the angle between the unit vectors **a** and **b**, then $\mathbf{a}-\sqrt{2}\,\mathbf{b}$ will be a unit vector if $\theta =$

(A) $\frac{\pi}{6}$ (B) $\frac{\pi}{4}$

(C) $p\mathbf{i}+q\mathbf{j}+r\mathbf{k}$ (D) $\frac{2\pi}{3}$

33. If the angle between **a** and **b** be 30^o, then the angle between 3 **a** and – 4 **b** will be

(A) 150^o (B) 90^o

(C) 120^o (D) 30^o

34. The angle between the vectors $\mathbf{i}-\mathbf{j}+\mathbf{k}$ and $\mathbf{i}+2\mathbf{j}+\mathbf{k}$ is

(A) $\cos^{-1}\left(\frac{1}{\sqrt{15}}\right)$ (B) $\cos^{-1}\left(\frac{4}{\sqrt{15}}\right)$

(C) $\cos^{-1}\left(\frac{4}{15}\right)$ (D) $\frac{\pi}{2}$

35. The position vector of vertices of a triangle *ABC* are $4\mathbf{i}-2\mathbf{j}, \mathbf{i}+4\mathbf{j}-3\mathbf{k}$ and $-\mathbf{i}+5\mathbf{j}+\mathbf{k}$ respectively, then $\angle ABC =$

(A) $\pi/6$ (B) $\pi/4$

(C) $\pi/3$ (D) $\pi/2$

36. The value of *x* for which the angle between the vectors $\mathbf{a} = x\mathbf{i}-3\mathbf{j}-\mathbf{k}$, $\mathbf{b} = 2x\mathbf{i}+x\mathbf{j}-\mathbf{k}$ is acute and the angle between the vectors **b** and the axis of ordinate is obtuse, are

(A) 1, 2 (B) – 2, – 3

(C) $x > 0$ (D) None of these

37. If **a** and **b** are unit vectors and $\mathbf{a}-\mathbf{b}$ is also a unit vector, then the angle between **a** and **b** is

(A) $\frac{\pi}{4}$ (B) $\frac{\pi}{3}$

(C) $\frac{\pi}{2}$ (D) $\frac{2\pi}{3}$

38. If θ be the angle between two vectors **a** and **b**, then $\mathbf{a}.\mathbf{b} \geq 0$ if

(A) $0 \leq \theta \leq \pi$ (B) $\frac{\pi}{2} \leq \theta \leq \pi$

(C) $0 \leq \theta \leq \frac{\pi}{2}$ (D) None of these

39. If $\mathbf{a} = \mathbf{i}+2\mathbf{j}-3\mathbf{k}$ and $\mathbf{b} = 3\mathbf{i}-\mathbf{j}+2\mathbf{k}$, then the angle between the vectors $\mathbf{a}+\mathbf{b}$ and $\mathbf{a}-\mathbf{b}$ is

(A) 30^o (B) 60^o

(C) 90^o (D) 0^o

40. The value of *x* for which the angle between the vectors $\mathbf{a} = -3\mathbf{i}+x\mathbf{j}+\mathbf{k}$ and $\mathbf{b} = x\mathbf{i}+2x\mathbf{j}+\mathbf{k}$ is acute and the angle between **b** and *x*-axis lies between $\pi/2$ and π satisfy

(A) $x > 0$ (B) $x < 0$

(C) $x > 1$ only (D) $x < -1$ only

Vector or Cross product of two vectors and its applications

41. If $A(-1, 2, 3), B(1, 1, 1)$ and $C(2, -1, 3)$ are points on a plane. A unit normal vector to the plane *ABC* is

(A) $\pm\left(\frac{2\mathbf{i}+2\mathbf{j}+\mathbf{k}}{3}\right)$ (B) $\pm\left(\frac{2\mathbf{i}-2\mathbf{j}+\mathbf{k}}{3}\right)$

(C) $\pm\left(\frac{2\mathbf{i}-2\mathbf{j}-\mathbf{k}}{3}\right)$ (D) $-\left(\frac{2\mathbf{i}+2\mathbf{j}+\mathbf{k}}{3}\right)$

42. The unit vector perpendicular to the vectors $6\mathbf{i}+2\mathbf{j}+3\mathbf{k}$ and $3\mathbf{i}-6\mathbf{j}-2\mathbf{k}$, is

(A) $\frac{2\mathbf{i}-3\mathbf{j}+6\mathbf{k}}{7}$ (B) $\frac{2\mathbf{i}-3\mathbf{j}-6\mathbf{k}}{7}$

(C) $\frac{2\mathbf{i}+3\mathbf{j}-6\mathbf{k}}{7}$ (D) $\frac{2\mathbf{i}+3\mathbf{j}+6\mathbf{k}}{7}$

43. For any two vectors **a** and **b**, $(\mathbf{a}\times\mathbf{b})^2$ is equal to

(A) a^2-b^2 (B) a^2+b^2

(C) $a^2b^2-(\mathbf{a}.\mathbf{b})^2$ (D) None of these

44. The unit vector perpendicular to $3\mathbf{i}+2\mathbf{j}-\mathbf{k}$ and $12\mathbf{i}+5\mathbf{j}-5\mathbf{k}$, is

(A) $\frac{5\mathbf{i}-3\mathbf{j}+9\mathbf{k}}{\sqrt{115}}$ (B) $\frac{5\mathbf{i}+3\mathbf{j}-9\mathbf{k}}{\sqrt{115}}$

(C) $\frac{-5\mathbf{i}+3\mathbf{j}-9\mathbf{k}}{\sqrt{115}}$ (D) $\frac{5\mathbf{i}+3\mathbf{j}+9\mathbf{k}}{\sqrt{115}}$

45. The sine of the angle between the two vectors $3\mathbf{i}+2\mathbf{j}-\mathbf{k}$ and $12\mathbf{i}+5\mathbf{j}-5\mathbf{k}$ will be

(A) $\frac{\sqrt{115}}{\sqrt{14}\sqrt{194}}$ (B) $\frac{51}{\sqrt{14}\sqrt{144}}$

(C) $\frac{\sqrt{64}}{\sqrt{14}\sqrt{194}}$ (D) None of these

46. For any two vectors **a** and **b**, if $\mathbf{a}\times\mathbf{b}=\mathbf{0}$, then

(A) $\mathbf{a}=\mathbf{0}$ (B) $\mathbf{b}=\mathbf{0}$

(C) Not parallel (D) None of these

47. If **a** and **b** are two vectors, then $(\mathbf{a}\times\mathbf{b})^2$ equals

(A) $\begin{vmatrix}\mathbf{a}.\mathbf{b} & \mathbf{a}.\mathbf{a}\\ \mathbf{b}.\mathbf{b} & \mathbf{b}.\mathbf{a}\end{vmatrix}$ (B) $\begin{vmatrix}\mathbf{a}.\mathbf{a} & \mathbf{a}.\mathbf{b}\\ \mathbf{b}.\mathbf{a} & \mathbf{b}.\mathbf{b}\end{vmatrix}$

(C) $\begin{vmatrix}\mathbf{a}.\mathbf{b}\\ \mathbf{b}.\mathbf{a}\end{vmatrix}$ (D) None of these

48. For any vectors **a, b, c**
$\mathbf{a}\times(\mathbf{b}+\mathbf{c})+\mathbf{b}\times(\mathbf{c}+\mathbf{a})+\mathbf{c}\times(\mathbf{a}+\mathbf{b})=$

(A) $\mathbf{0}$ (B) $\mathbf{a}+\mathbf{b}+\mathbf{c}$

(C) $[\mathbf{a}\,\mathbf{b}\,\mathbf{c}]$ (D) $\mathbf{a}\times\mathbf{b}\times\mathbf{c}$

49. If $\mathbf{a}.\mathbf{b}=\mathbf{a}.\mathbf{c}$, $\mathbf{a}\times\mathbf{b}=\mathbf{a}\times\mathbf{c}$ and $\mathbf{a}\neq\mathbf{0}$, then

(A) $\mathbf{b}=\mathbf{0}$ (B) $\mathbf{b}\neq\mathbf{c}$

(C) $\mathbf{b}=\mathbf{c}$ (D) None of these

50. If $|\mathbf{a}|=2$, $|\mathbf{b}|=5$ and $|\mathbf{a}\times\mathbf{b}|=8$, then $\mathbf{a}.\mathbf{b}$ is equal to

(A) 0 (B) 2

(C) 4 (D) 6

51. $\mathbf{r}\times\mathbf{a}=\mathbf{b}\times\mathbf{a}$; $\mathbf{r}\times\mathbf{b}=\mathbf{a}\times\mathbf{b}$; $\mathbf{a}\neq 0$; $\mathbf{b}\neq 0$; $\mathbf{a}\neq\lambda\mathbf{b}$, **a** is not perpendicular to **b**, then $\mathbf{r}=$

(A) $\mathbf{a}-\mathbf{b}$ (B) $\mathbf{a}+\mathbf{b}$

(C) $\mathbf{a}\times\mathbf{b}+\mathbf{a}$ (D) $\mathbf{a}\times\mathbf{b}+\mathbf{b}$

52. If **i**, **j**, **k** are unit orthonormal vectors and **a** is a vector, if $\mathbf{a}\times\mathbf{r}=\mathbf{j}$, then $\mathbf{a}.\mathbf{r}$ is

(A) 0 (B) 1

(C) – 1 (D) Arbitrary scalar

53. A unit vector perpendicular to each of the vector $2\mathbf{i}-\mathbf{j}+\mathbf{k}$ and $3\mathbf{i}+4\mathbf{j}-\mathbf{k}$ is equal to

(A) $\frac{(-3\mathbf{i}+5\mathbf{j}+11\mathbf{k})}{\sqrt{155}}$ (B) $\frac{(3\mathbf{i}-5\mathbf{j}+11\mathbf{k})}{\sqrt{155}}$

(C) $\frac{(6\mathbf{i}-4\mathbf{j}-\mathbf{k})}{\sqrt{53}}$ (D) $\frac{(5\mathbf{i}+3\mathbf{j})}{\sqrt{34}}$

54. If $\vec{A}=3\mathbf{i}+\mathbf{j}+2\mathbf{k}$ and $\vec{B}=2\mathbf{i}-2\mathbf{j}+4\mathbf{k}$ and θ is the angle between $\vec{A}$ and $\vec{B}$, then the value of $\sin\theta$ is

(A) $\frac{2}{\sqrt{7}}$ (B) $\sqrt{\frac{2}{7}}$

(C) $\frac{4}{\sqrt{7}}$ (D) $\frac{3}{\sqrt{7}}$

55. A unit vector perpendicular to vector **c** and coplanar with vectors **a** and **b** is

(A) $\frac{\mathbf{a}\times(\mathbf{b}\times\mathbf{c})}{|\mathbf{a}\times(\mathbf{b}\times\mathbf{c})|}$ (B) $\frac{\mathbf{b}\times(\mathbf{c}\times\mathbf{a})}{|\mathbf{b}\times(\mathbf{c}\times\mathbf{a})|}$

(C) $\frac{\mathbf{c}\times(\mathbf{a}\times\mathbf{b})}{|\mathbf{c}\times(\mathbf{a}\times\mathbf{b})|}$ (D) None of these

Scalar triple product and their applications

56. Let *a, b, c* be distinct non-negative numbers. If the vectors $a\mathbf{i}+a\mathbf{j}+c\mathbf{k}$, $\mathbf{i}+\mathbf{k}$ and $c\mathbf{i}+c\mathbf{j}+b\mathbf{k}$ lie in a plane, then *c* is
(A) The arithmetic mean of *a* and *b*
(B) The geometric mean of *a* and *b*
(C) The harmonic mean of *a* and *b*
(D) Equal to zero

57. If **a, b, c** are any three vectors and their inverse are $\mathbf{a}^{-1},\mathbf{b}^{-1},\mathbf{c}^{-1}$ and $[\mathbf{a}\,\mathbf{b}\,\mathbf{c}]\neq 0$, then $[\mathbf{a}^{-1}\,\mathbf{b}^{-1}\,\mathbf{c}^{-1}]$ will be
(A) Zero (B) One
(C) Non-zero (D) $[\mathbf{a}\,\mathbf{b}\,\mathbf{c}]$

58. If $\mathbf{a}=\mathbf{i}-\mathbf{j}+\mathbf{k}$, $\mathbf{b}=\mathbf{i}+2\mathbf{j}-\mathbf{k}$ and $\mathbf{c}=3\mathbf{i}+p\mathbf{j}+5\mathbf{k}$ are coplanar then the value of *p* will be
(A) – 6 (B) – 2
(C) 2 (D) 6

59. If $\mathbf{i},\mathbf{j},\mathbf{k}$ are the unit vectors and mutually perpendicular, then $[\mathbf{i}\,\mathbf{k}\,\mathbf{j}]$ is equal to
(A) 0 (B) – 1
(C) 1 (D) None of these

60. If three vectors $\mathbf{a}=12\mathbf{i}+4\mathbf{j}+3\mathbf{k}$, $\mathbf{b}=8\mathbf{i}-12\mathbf{j}-9\mathbf{k}$ and $\mathbf{c}=33\mathbf{i}-4\mathbf{j}-24\mathbf{k}$ represents a cube, then its volume will be
(A) 616 (B) 308
(C) 154 (D) None of these

61. If $\mathbf{a}=2\mathbf{i}+\mathbf{j}-\mathbf{k}$, $\mathbf{b}=\mathbf{i}+2\mathbf{j}+\mathbf{k}$ and $\mathbf{c}=\mathbf{i}-\mathbf{j}+2\mathbf{k}$, then $\mathbf{a}.(\mathbf{b}\times\mathbf{c})=$
(A) 6 (B) 10
(C) 12 (D) 24

62. Three concurrent edges *OA, OB, OC* of a parallelopiped are represented by three vectors $2\mathbf{i}+\mathbf{j}-\mathbf{k}$, $\mathbf{i}+2\mathbf{j}+3\mathbf{k}$ and $-3\mathbf{i}-\mathbf{j}+\mathbf{k}$, the volume of the solid so formed in cubic unit is
(A) 5 (B) 6
(C) 7 (D) 8

63. If $\mathbf{x}.\mathbf{a}=0$, $\mathbf{x}.\mathbf{b}=0$ and $\mathbf{x}.\mathbf{c}=0$ for some non-zero vector **x**, then the ture statement is
(A) $[\mathbf{a}\;\mathbf{b}\;\mathbf{c}]=0$ (B) $[\mathbf{a}\;\mathbf{b}\;\mathbf{c}]\neq 0$
(C) $[\mathbf{a}\;\mathbf{b}\;\mathbf{c}]=1$ (D) None of these

64. If the given vectors $(-bc, b^2+bc, c^2+bc)$, $(a^2+ac, -ac, c^2+ac)$ and $(a^2+ab, b^2+ab, -ab)$ are coplanar, where none of *a*, *b* and *c* is zero, then
(A) $a^2+b^2+c^2=1$
(B) $bc+ca+ab=0$
(C) $a+b+c=0$
(D) $a^2+b^2+c^2=bc+ca+ab$

65. If $\mathbf{a},\mathbf{b},\mathbf{c}$ are three coplanar vectors, then $[\mathbf{a}+\mathbf{b}\;\;\mathbf{b}+\mathbf{c}\;\;\mathbf{c}+\mathbf{a}]=$
(A) $[\mathbf{a}\,\mathbf{b}\,\mathbf{c}]$ (B) 2 $[\mathbf{a}\,\mathbf{b}\,\mathbf{c}]$
(C) 3 $[\mathbf{a}\,\mathbf{b}\,\mathbf{c}]$ (D) 0

66. If a, b, c are vectors such that $[a\,b\,c]=4$, then $[a\times b\;\; b\times c\;\; c\times a]=$
(A) 16 (B) 64
(C) 4 (D) 8

67. The volume of the parallelopiped whose conterminous edges are $i-j+k$, $2i-4j+5k$ and $3i-5j+2k$ is
(A) 4 (B) 3
(C) 2 (D) 8

68. $[i\,k\,j]+[k\,j\,i]+[j\,k\,i]$
(A) 1 (B) 3
(C) – 3 (D) – 1

69. If **u**, **v** and **w** are three non-coplanar vectors, then $(u+v-w).[(u-v)\times v-w)]$ equals
(A) 0 (B) $(u.(v\times w)$
(C) $(u.(w\times v)$ (D) $3u.(v\times w)$

70. $a.[(b+c)\times(a+b+c)]$ is equal to
(A) $[\mathbf{a}\,\mathbf{b}\,\mathbf{c}]$ (B) $2[\mathbf{a}\,\mathbf{b}\,\mathbf{c}]$
(C) $3[\mathbf{a}\,\mathbf{b}\,\mathbf{c}]$ (D) 0

Vector triple product

71. $\mathbf{a}\times(\mathbf{b}\times\mathbf{c})$ is equal to
(A) $(\mathbf{a}.\mathbf{c})\mathbf{b}-(\mathbf{a}.\mathbf{a})\mathbf{b}$ (B) $(\mathbf{a}.\mathbf{c})\mathbf{a}-(\mathbf{b}.\mathbf{c})\mathbf{a}$
(C) $(\mathbf{a}.\mathbf{c})\mathbf{b}-(\mathbf{a}.\mathbf{b})\mathbf{c}$ (D) $(\mathbf{a}.\mathbf{b})\mathbf{c}-(\mathbf{a}.\mathbf{c})\mathbf{b}$

72. If $\mathbf{a}\times\mathbf{b}=\mathbf{c}$, $\mathbf{b}\times\mathbf{c}=\mathbf{a}$ and *a, b, c* be moduli of the vectors **a**, **b**, **c** respectively, then
(A) $a=1, b=c$ (B) $c=1, a=1$
(C) $b=2, c=2a$ (D) $b=1, c=a$

73. If $\mathbf{a} = 3\mathbf{i} - \mathbf{j} + 2\mathbf{k}$, $\mathbf{b} = 2\mathbf{i} + \mathbf{j} - \mathbf{k}$ and $\mathbf{c} = \mathbf{i} - 2\mathbf{j} + 2\mathbf{k}$, then $(\mathbf{a} \times \mathbf{b}) \times \mathbf{c}$ is equal to

(A) $24\mathbf{i} + 7\mathbf{j} - 5\mathbf{k}$ (B) $7\mathbf{i} - 24\mathbf{j} + 5\mathbf{k}$

(C) $12\mathbf{i} + 3\mathbf{j} - 5\mathbf{k}$ (D) $\mathbf{i} + \mathbf{j} - 7\mathbf{k}$

74. $\mathbf{i} \times (\mathbf{j} \times \mathbf{k}) =$

(A) 1 (B) 0

(C) – 1 (D) None of these

75. If three unit vectors **a**, **b**, **c** are such that $\mathbf{a} \times (\mathbf{b} \times \mathbf{c}) = \frac{\mathbf{b}}{2}$, then the vector **a** makes with **b** and **c** respectively the angles

(A) $40^\circ, 80^\circ$ (B) $45^\circ, 45^\circ$

(C) $30^\circ, 60^\circ$ (D) $90^\circ, 60^\circ$

Application of vectors in three dimensional geometry

76. 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

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

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

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

(D) None of these

77. The vector equation of the plane passing through the origin and the line of intersection of the plane $\mathbf{r}.\mathbf{a} = \lambda$ and $\mathbf{r}.\mathbf{b} = \mu$ is

(A) $\mathbf{r}.(\lambda\mathbf{a} - \mu\mathbf{b}) = 0$ (B) $\mathbf{r}.(\lambda\mathbf{b} - \mu\mathbf{a}) = 0$

(C) $\mathbf{r}.(\lambda\mathbf{a} + \mu\mathbf{b}) = 0$ (D) $\mathbf{r}.(\lambda\mathbf{b} + \mu\mathbf{a}) = 0$

78. The position vectors of points *A* and *B* are $\mathbf{i} - \mathbf{j} + 3\mathbf{k}$ and $3\mathbf{i} + 3\mathbf{j} + 3\mathbf{k}$ respectively. The equation of a plane is $\mathbf{r}.(5\mathbf{i} + 2\mathbf{j} - 7\mathbf{k}) + 9 = 0$. The points *A* and *B*

(A) Lie on the plane

(B) Are on the same side of the plane

(C) Are on the opposite side of the plane

(D) None of these

79. The vector equation of the plane through the point $2\mathbf{i} - \mathbf{j} - 4\mathbf{k}$ and parallel to the plane $\mathbf{r}.(4\mathbf{i} - 12\mathbf{j} - 3\mathbf{k}) - 7 = 0$ is

(A) $\mathbf{r}.(4\mathbf{i} - 12\mathbf{j} - 3\mathbf{k}) = 0$

(B) $\mathbf{r}.(4\mathbf{i} - 12\mathbf{j} - 3\mathbf{k}) = 32$

(C) $\mathbf{r}.(4\mathbf{i} - 12\mathbf{j} - 3\mathbf{k}) = 12$

(D) None of these

80. The vector equation of the plane through the point (2, 1, –1) and passing through the line of intersection of the plane $\mathbf{r}.(\mathbf{i} + 3\mathbf{j} - \mathbf{k}) = 0$ and $\mathbf{r}.(\mathbf{j} + 2\mathbf{k}) = 0$ is

(A) $\mathbf{r}.(\mathbf{i} + 9\mathbf{j} + 11\mathbf{k}) = 0$

(B) $\mathbf{r}.(\mathbf{i} + 9\mathbf{j} + 11\mathbf{k}) = 6$

(C) $\mathbf{r}.(\mathbf{i} - 3\mathbf{j} - 13\mathbf{k}) = 0$

(D) None of these

System of co-ordinates, Direction cosines and direction ratios, Projection

81. Distance of the point (1, 2, 3) from the co-ordinate axes are

(A) 13, 10, 5 (B) $\sqrt{13}, \sqrt{10}, \sqrt{5}$

(C) $\sqrt{5}, \sqrt{13}, \sqrt{10}$ (D) $\frac{1}{\sqrt{13}}, \frac{1}{\sqrt{10}}, \frac{1}{\sqrt{5}}$

82. If the centroid of triangle whose vertices are (*a*,1, 3), (– 2, *b*, –5) and (4, 7, *c*) be the origin, then the values of *a*, *b*, *c* are

(A) – 2, –8, –2 (B) 2, 8, –2

(C) –2, –8, 2 (D) 7, –1, 0

83. Which of the following set of points are non-collinear

(A) (1, –1, 1), (–1, 1, 1), (0, 0, 1)

(B) (1, 2, 3), (3, 2, 1), (2, 2, 2)

(C) (–2,4, –3), (4, –3, –2), (–3, –2, 4)

(D) (2, 0, –1), (3, 2, –2), (5, 6, –4)

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

(A) $\frac{1}{3}$ (B) $\frac{1}{2}$

(C) $\frac{1}{\sqrt{3}}$ (D) $\frac{1}{\sqrt{2}}$

85. If a line makes angles of 30° and 45° with x-axis and y-axis, then the angle made by it with $z-$axis is

(A) 45° (B) 60°
(C) 120° (D) None of these

86. Direction ratios of the normal to the plane passing through the points (0, 1, 1), (1, 1, 2) and (–1, 2, – 2) are

(A) (1, 1, 1) (B) (2, 1, –1)
(C) (1, 2, –1) (D) (1, – 2, – 1)

87. If the length of a vector be 21 and direction ratios be 2, – 3, 6 then its direction cosines are

(A) $\frac{2}{21}, \frac{-1}{7}, \frac{2}{7}$ (B) $\frac{2}{7}, \frac{-3}{7}, \frac{6}{7}$
(C) $\frac{2}{7}, \frac{3}{7}, \frac{6}{7}$ (D) None of these

88. If the co-ordinates of the points P, Q, R, S be (1, 2, 3), (4, 5, 7), (– 4, 3, – 6) and (2, 0, 2) respectively, then

(A) $PQ \parallel RS$ (B) $PQ \perp RS$
(C) $PQ = RS$ (D) None of these

89. If the co-ordinates of the points A, B, C, D be (2, 3, –1), (3, 5, – 3), (1, 2, 3) and (3, 5, 7) respectively, then the projection of AB on CD is

(A) 0 (B) 1
(C) 2 (D) $\sqrt{3}$

90. If the co-ordinates of the points P and Q be (1, –2, 1) and (2, 3, 4) and O be the origin, then

(A) $OP = OQ$ (B) $OP \perp OQ$
(C) $OP \parallel OQ$ (D) None of these

91. If the sum of the squares of the distance of a point from the three co-ordinate axes be 36,then its distance from the origin is

(A) 6 (B) $3\sqrt{2}$
(C) $2\sqrt{3}$ (D) None of these

92. The line joining the points $(-2, 1, -8)$ and (a, b, c) is parallel to the line whose direction ratios are 6, 2, 3. The values of a, b, c are

(A) 4, 3, –5 (B) 1, 2, –13/2
(C) 10, 5, –2 (D) None of these

93. The direction ratios of the line joining the points (4, 3, –5) and (–2, 1, –8) are

(A) $\frac{6}{7}, \frac{2}{7}, \frac{3}{7}$ (B) 6, 2, 3
(C) $2, 4, -13$ (D) None of these

94. The co-ordinates of the point in which the line joining the points $(3, 5, -7)$ and $(-2, 1, 8)$ is intersected by the plane yz are given by

(A) $\left(0, \frac{13}{5}, 2\right)$ (B) $\left(0, -\frac{13}{5}, -2\right)$
(C) $\left(0, -\frac{13}{5}, \frac{2}{5}\right)$ (D) $\left(0, \frac{13}{5}, \frac{2}{5}\right)$

95. The co-ordinates of a point which is equidistant from the points (0,0,0), (a,0,0), (0,b,0), and $(0, 0, c)$ are given by

(A) $\left(\frac{a}{2}, \frac{b}{2}, \frac{c}{2}\right)$ (B) $\left(-\frac{a}{2}, -\frac{b}{2}, \frac{c}{2}\right)$
(C) $\left(\frac{a}{2}, -\frac{b}{2}, -\frac{c}{2}\right)$ (D) $\left(-\frac{a}{2}, \frac{b}{2}, -\frac{c}{2}\right)$

Line

96. The co-ordinates of the foot of perpendicular drawn from the origin to the line joining the points (–9, 4, 5) and (10, 0, –1) will be

(A) (– 3, 2, 1) (B) (1, 2, 2)
(C) (4, 5, 3) (D) None of these

97. The symmetric equation of lines $3x + 2y + z - 5 = 0$ and $x + y - 2z - 3 = 0$, is

(A) $\frac{x-1}{5} = \frac{y-4}{7} = \frac{z-0}{1}$
(B) $\frac{x+1}{5} = \frac{y+4}{7} = \frac{z-0}{1}$
(C) $\frac{x+1}{-5} = \frac{y-4}{7} = \frac{z-0}{1}$
(D) $\frac{x-1}{-5} = \frac{y-4}{7} = \frac{z-0}{1}$

98. The angle between the lines whose direction cosines satisfy the equations $l + m + n = 0$, $l^2 + m^2 - n^2 = 0$ is given by

(A) $\frac{2\pi}{3}$ (B) $\frac{\pi}{6}$
(C) $\frac{5\pi}{6}$ (D) $\frac{\pi}{3}$

99. The equation of straight line passing through the points (a, b, c) and $(a - b, b - c, c - a)$, is

(A) $\frac{x-a}{a-b}=\frac{y-b}{b-c}=\frac{z-c}{c-a}$

(B) $\frac{x-a}{b}=\frac{y-b}{c}=\frac{z-c}{a}$

(C) $\frac{x-a}{a}=\frac{y-b}{b}=\frac{z-c}{c}$

(D) $\frac{x-a}{2a-b}=\frac{y-b}{2b-c}=\frac{z-c}{2c-a}$

100. The equation of straight line passing through the point (a, b, c) and parallel to z- axis, is

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

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

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

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

101. The length of the perpendicular drawn from the point (5, 4, –1) on the line $\frac{x-1}{2}=\frac{y}{9}=\frac{z}{5}$ is

(A) $\sqrt{\frac{110}{2109}}$ (B) $\sqrt{\frac{2109}{110}}$

(C) $\frac{2109}{110}$ (D) 54

102. The length of the perpendicular from point (1, 2, 3) to the line $\frac{x-6}{3}=\frac{y-7}{2}=\frac{z-7}{-2}$ is

(A) 5 (B) 6

(C) 7 (D) 8

103. The angle between the lines whose direction cosines are connected by the relations $l+m+n=0$ and $2lm+2nl-mn=0$, is

(A) $\frac{\pi}{3}$ (B) $\frac{2\pi}{3}$

(C) π (D) None of these

104. The perpendicular distance of the point (2, 4, –1) from the line $\frac{x+5}{1}=\frac{y+3}{4}=\frac{z-6}{-9}$ is

(A) 3 (B) 5

(C) 7 (D) 9

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

(C) $\cos^{-1}\left(\frac{3}{9}\right)$ (D) $\cos^{-1}\left(\frac{4}{9}\right)$

Plane

106. The equation of the plane which is parallel to the plane $x-2y+2z=5$ and whose distance from the point $(1,2,3)$ is 1, is

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

(C) $x-2y+2z=6$ (D) $x-2y+2z+6=0$

107. The equation of the plane through (1, 2, 3) and parallel to the plane $2x+3y-4z=0$ is

(A) $2x+3y+4z=4$

(B) $2x+3y+4z+4=0$

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

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

108. Distance of the point (2,3,4) from the plane $3x-6y+2z+11=0$ is

(A) 1 (B) 2

(C) 3 (D) 0

109. The equation of the plane containing the line of intersection of the planes $2x-y=0$ and $y-3z=0$ and perpendicular to the plane $4x+5y-3z-8=0$ is

(A) $28x-17y+9z=0$

(B) $28x+17y+9z=0$

(C) $28x-17y+9x=0$

(D) $7x-3y+z=0$

110. A point moves in such a way that the sum of its distance from *xy*-plane and *yz*-plane remains equal to its distance from *zx*-plane. The locus of the point is

(A) $x-y+z=2$ (B) $x+y-z=0$

(C) $x-y+z=0$ (D) $x-y-z=2$

111. A point moves so that its distances from the points (3, 4, –2) and (2, 3, – 3) remains equal. The locus of the point is
(A) A line
(B) A plane whose normal is equally inclined to axes
(C) A plane which passes through the origin
(D) A sphere

112. The equation of the perpendicular from the point (α, β, γ) to the plane $ax + by + cz + d = 0$ is
(A) $a(x-\alpha) + b(y-\beta) + c(z-\gamma) = 0$
(B) $\frac{x-\alpha}{a} = \frac{y-\beta}{b} = \frac{z-\gamma}{c}$
(C) $a(x-\alpha) + b(y-\beta) + c(z-\gamma) = abc$
(D) None of these

113. The equation of *yz*-plane is
(A) $x = 0$ (B) $y = 0$
(C) $z = 0$ (D) $x + y + z = 0$

114. The angle between the planes $2x - y + z = 6$ and $x + y + 2z = 7$ is
(A) 30° (B) 45°
(C) 0° (D) 60°

115. The equation of the plane passing through the line of intersection of the planes $x + y + z = 1$ and $2x + 3y - z + 4 = 0$ and parallel to *x*-axis is
(A) $y - 3z - 6 = 0$ (B) $y - 3z + 6 = 0$
(C) $y - z - 1 = 0$ (D) $y - z + 1 = 0$

116. The angle between two planes is equal to
(A) The angle between the tangents to them from any point
(B) The angle between the normals to them from any point
(C) The angle between the lines parallel to the planes from any point
(D) None of these

117. In three dimensional space, the equation $3y + 4z = 0$ represents
(A) A plane containing *x*-axis
(B) A plane containing *y*-axis
(C) A plane containing *z*-axis
(D) A line with direction ratios 0, 3, 4

118. A plane meets the co-ordinate axes in A, B, C and (α, β, γ) is the centered of the triangle ABC. Then the equation of the plane is
(A) $\frac{x}{\alpha} + \frac{y}{\beta} + \frac{z}{\gamma} = 3$ (B) $\frac{x}{\alpha} + \frac{y}{\beta} + \frac{z}{\gamma} = 1$
(C) $\frac{3x}{\alpha} + \frac{3y}{\beta} + \frac{3z}{\gamma} = 1$ (D) $\alpha x + \beta y + \gamma z = 1$

119. If the planes $3x - 2y + 2z + 17 = 0$ and $4x + 3y - kz = 25$ are mutually perpendicular, then $k =$
(A) 3 (B) – 3
(C) 9 (D) – 6

120. If *O* is the origin and *A* is the point (*a*, *b*, *c*) then the equation of the plane through *A* and at right angles to *OA* is
(A) $a(x-a) - b(y-b) - c(z-c) = 0$
(B) $a(x+a) + b(y+b) + c(z+c) = 0$
(C) $a(x-a) + b(y-b) + c(z-c) = 0$
(D) None of these

121. If from a point $P(a, b, c)$ perpendiculars PA and PB are drawn to *yz* and *zx* planes, then the equation of the plane OAB is
(A) $bcx + cay + abz = 0$
(B) $bcx + cay - abz = 0$
(C) $bcx - cay + abz = 0$
(D) $-bcx + cay + abz = 0$

122. The graph of the equation $y^2 + z^2 = 0$ in three dimensional space is
(A) *x*-axis (B) *z*-axis
(C) *y*-axis (D) *yz*-plane

123. A variable plane is at a constant distance *p* from the origin and meets the axes in *A*, *B* and *C*. The locus of the centroid of the tetrahedron OABC is
(A) $x^{-2} + y^{-2} + z^{-2} = 16p^{-2}$
(B) $x^{-2} + y^{-2} + z^{-2} = 16p^{-1}$
(C) $x^{-2} + y^{-2} + z^{-2} = 16$
(D) None of these

124. The plane $ax+by+cz=1$ meets the co-ordinate axes in *A*, *B* and *C*. The centroid of the triangle 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) $\left(\frac{1}{3a}, \frac{1}{3b}, \frac{1}{3c}\right)$

125. The equation of a plane which cuts equal intercetps of unit length on the axes, is

(A) $x+y+z=0$ (B) $x+y+z=1$

(C) $x+y-z=1$ (D) $\frac{x}{a}+\frac{y}{a}+\frac{z}{a}=1$

Line and plane

126. The point where the line $\frac{x-1}{2}=\frac{y-2}{-3}=\frac{z+3}{4}$ meets the plane $2x+4y-z=1$, is

(A) (3, –1, 1) (B) (3, 1, 1)

(C) (1, 1, 3) (D) (1, 3, 1)

127. 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 the plane $x-y+z=5$, is

(A) 10 (B) 11

(C) 12 (D) 13

128. The equation of the line passing through (1, 2, 3) and parallel to the planes $x-y+2z=5$ and $3x+y+z=6$, is

(A) $\frac{x-1}{-3}=\frac{y-2}{5}=\frac{z-3}{4}$

(B) $\frac{x-1}{-3}=\frac{y-2}{-5}=\frac{z-1}{4}$

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

(D) None of these

129. The line drawn from (4, –1, 2) to the point (–3, 2, 3) meets a plane at right angles at the point (–10, 5, 4), then the equation of plane is

(A) $7x-3y-z+89=0$

(B) $7x+3y+z+89=0$

(C) $7x-3y+z+89=0$

(D) None of these

130. The ratio in which the line joining the points (*a*, *b*, *c*) and (–*a*, –*c*, –*b*) is divided by the *xy*-plane is

(A) $a:b$ (B) $b:c$

(C) $c:a$ (D) $c:b$

131. The line $\frac{x+3}{3}=\frac{y-2}{-2}=\frac{z+1}{1}$ and the plane $4x+5y+3z-5=0$ intersect at a point

(A) (3, 1, –2) (B) (3, – 2, 1)

(C) (2, –1, 3) (D) (–1, –2, –3)

132. If line $\frac{x-x_1}{l}=\frac{y-y_1}{m}=\frac{z-z_1}{n}$ is parallel to the plane $ax+by+cz+d=0$, then

(A) $\frac{a}{l}=\frac{b}{m}=\frac{c}{n}$

(B) $al+bm+cn=0$

(C) $\frac{a}{l}+\frac{b}{m}+\frac{c}{n}=0$

(D) None of these

133. The equation of plane through the line of intersection of planes $ax+by+cz+d=0$, $a'x+b'y+c'z+d'=0$ and parallel to the line $y=0, z=0$ is

(A) $(ab'-a'b)x+(bc'-b'c)y+(ad'-a'd)=0$

(B) $(ab'-a'b)x+(bc'-b'c)y+(ad'-a'd)z=0$

(C) $(ab'-a'b)y+(ac'-a'c)z+(ad'-a'd)=0$

(D) None of these

134. The equation of the plane which bisects the line joining (2, 3, 4) and (6, 7, 8) is

(A) $x+y+z-15=0$ (B) $x-y+z-15=0$

(C) $x-y-z-15=0$ (D) $x+y+z+15=0$

135. The line $\frac{x-2}{3}=\frac{y-3}{4}=\frac{z-4}{5}$ is parallel to the plane

(A) $2x+3y+4z=29$

(B) $3x+4y-5z=10$

(C) $3x+4y+5z=38$

(D) $x+y+z=0$

Sphere

136. The centre of sphere passes through four points (0, 0, 0), (0, 2, 0), (1, 0, 0) and (0, 0, 4) is

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

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

137. The equation of the sphere touching the three co-ordinate planes is

(A) $x^2+y^2+z^2+2a(x+y+z)+2a^2=0$

(B) $x^2+y^2+z^2-2a(x+y+z)+2a^2=0$

(C) $x^2+y^2+z^2\pm 2a(x+y+z)+2a^2=0$

(D) None of these

138. Let (3, 4, –1) and (–1, 2, 3) are the end points of a diameter of sphere. Then the radius of the sphere is equal to

(A) 1 (B) 2

(C) 3 (D) 9

139. Co-ordinate of a point equidistant from the points (0,0,0), (a, 0, 0), (0, b, 0), (0, 0, c) is

(A) $\left(\frac{a}{4},\frac{b}{4},\frac{c}{4}\right)$ (B) $\left(\frac{a}{2},\frac{b}{4},\frac{c}{4}\right)$

(C) $\left(\frac{a}{2},\frac{b}{2},\frac{c}{2}\right)$ (D) (a, b, c)

140. How many different sphere of radius 'r' can be drawn which touches all the three co-ordinate axes

(A) 4 (B) 2

(C) 6 (D) 8