MATHS

BOOKS - DEEPTI MATHS (TELUGU ENGLISH)

PRODUCTS OF VECTORS

Solved Examples

1. Let a = 2i - j + k, b = I + 2j - k and c = I + j - 2k be three vectors. A vector in the plane of b and c whose projection on a is of magnitude $\sqrt{2/3}$ is

A. 2i + 3j - 3k

B. 2i + 2j + 3k

C. -2i - j + 5k

D. 2i + j + 5k

Answer: A

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2. If a vector a expressed as the sum of two vectors $\vec{\alpha}$ and $\vec{\beta}$ along and perpendicular to a given vector b, then $\vec{\beta}$ =

A. $\frac{(a \times b) \times b}{|b|^2}$

B. $\frac{b \times (a \times b)}{|b|^2}$

C. $\frac{b \times (a \times b)}{|b|}$

D. ((a.b)/(|b|^(2)))b`

Answer: B

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3. Let a,b,c the distinct non-negative numbers. If the vectors ai + aj + ck, I + k and ci + cj + bk lie in a plane, then c is

A. the arthithmetic mean of a and b

B. the geometric mean of a and b

C. the harmonic of a and b

D. equal to zero

Answer: B

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4. Let $a = i - k$, $b = xi + j + (1 - x)k$ and $c = yi + xj + (1 + x - y)k$. Then $[a,b,c]$ depends on

A. only x

B. only y

C. neither x nor y

D. both x and y

Answer: C

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5. Let a = 2i + j - 2k and b = I + j. If c is vector such that ac = |c|, |c - a| = $2\sqrt{2}$ and the angle between $a \times b$ and c is 30°, then $|(a \times b) \times c|$ =

A. $2/3$

B. $3/2$

C. 2

D. 3

Answer: B

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6. Let v = 2i + j - k and w = I + 3k. If u is unit vector. Then the maximum value of the scalar triple product [u v w] is

A. -1

B. $\sqrt{10} + \sqrt{16}$

C. $\sqrt{59}$

D. $\sqrt{6}$

Answer: C

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7. Let P,Q,R be points with poistion vectors $r_1 = 3i - 2j - k, r_2 = I + 3j + 4k$ and $r_3 = 2i + j - 2k$ relavtive to an origin. The distance of P from the plane OQR is

A. 2

B. 3

C. 1

D. $11/\sqrt{3}$

Answer: B

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8. Consider the parallelopiped wide sides a = 3i + 2j + k, b = I + j + 2k and c = I + 3j + 3k then the angle between a and the plane containing the face determined by b and c is

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

B. $\cos^{-1}\left(\frac{9}{14}\right)$

C. $\sin^{-1}\left(\frac{9}{14}\right)$

D. $\sin^{-1}\left(\frac{2}{3}\right)$

Answer: C

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Exercise 1 A

1. If |a| = 3, |b| = 4 and |a + b| = 1, then |a - b| =

A. 5

B. 6

C. 7

D. 8

Answer: C

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2. if θ is the angle between the unit vectors a,b then |a - b| =

A. sin $(\theta/2)$

B. 2 sin $(\theta/2)$

C. cos $(\theta/2)$

D. 2 Cos $(\theta/2)$

Answer: B

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3. If θ is the angle between the unit vectors a,b then |a + b| =

A. sin $(\theta/2)$

B. 2 sin $(\theta/2)$

C. cos $(\theta/2)$

D. 2 Cos $(\theta/2)$

Answer: D

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4. If a and b are unit vectors and α is the angle between them then a - b will be a unit vector if α =

A. $\pi/4$

B. $\pi/3$

C. $2\pi/3$

D. $\pi/2$

Answer: B

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5. If the unit vector a and b are inclined at an angle 2θ such that |a - b| $<$ 1 then θ lies in the interval

A. $[0, \pi/6]$

B. $[5\pi/6, \pi]$

C. $[\pi/6, \pi/2]$

D. $[\pi/2, 5\pi/6]$

Answer: A

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6. If a,b,c are three vectors such that a = b + c and the angle between b and c is $\pi/2$, then (here a = |a|, b = |b|, c = |c|)

A. $a^2 = b^2 + c^2$

B. $b^2 = c^2 + a^2$

C. $c^2 = a^2 + b^2$

D. $2a^2 - b^2 = c^2$

Answer: A

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7. If a + b + c = 0 and |a| = 3, |b| = 4 and |c| = $\sqrt{37}$ the angle between a and b is

A. $\pi / 4$

B. $\pi / 2$

C. $\pi / 6$

D. $\pi / 3$

Answer: D

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8. If a and b are noncollinear unit vectors and |a + b| $= \sqrt{3}$, then (2a + 5b). (3a - b) =

A. $15/4$

B. $15/2$

C. 15

D. none

Answer: B

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9. If a,b, are two vectors of lengths 2,1 respectively and |a - b| = $\sqrt{3}$ then (a,b) =

A. $\pi/4$

B. $\pi/6$

C. $\pi/3$

D. $\pi/2$

Answer: C

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10. If, in a right angled triangle ABC, the hypotenuse, AB = p, then AB.AC + BC . BA + CA. CB =

A. $2p^2$

B. $p^2/2$

C. p^2

D. none

Answer: C

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11. If a,b,c are unit vectors such that a + b + c = 0 then a.b + b.c + c + c . A=

A. 2

B. $3/2$

C. -2

D. $-3/2$

Answer: D

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12. If two out of the three vectors a,b,c are unit vectors, $a+b+c=0$ and $2.\ (a.\ b+b.\ c+c.\ a)+3=0$, then the third vector is of length

A. 3

B. 2

C. 1

D. 0

Answer: C

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13. If a,b,c are three vectors such that $a + b + c = 0$, $|a| = 1$, $|b| = 2$, $|c| = 3$ then $a.b + b.c + c.a =$

A. 0

B. -7

C. 7

D. 1

Answer: B

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14. If a,b,c are mutally perpendicular unit vectors, then |a + b + c| =

A. $\sqrt{2}$

B. 1

C. $\sqrt{3}$

D. 0

Answer: C

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15. If A.(B+ C) = B. (C + A) = C. (A + B) = 0, |A| = 3, |B| = 4, |C| = 5 then |A + B + C| =

A. 5

B. $5\sqrt{2}$

C. $5/\sqrt{2}$

D. $\sqrt{2}$

Answer: B

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16. If a,b,c are vector of length 4,4,5 respectively and a,b,c are perpendicular to b+ c , c + a, a+ b respectively, then |a + b + c| =

A. $\sqrt{57}$

B. $\sqrt{75}$

C. $\sqrt{47}$

D. 7

Answer: A

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17. Let u,v,w be such that |u| = 1, |v| = 2, |w| = 3. If the projection v along u is equal to that w along u and v,w are prependicular to each other then |u -

v + w| =

A. 1

B. 14

C. $\sqrt{14}$

D. $\sqrt{7}$

Answer: C

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18. If a,b and c are vectors with magnitudes 2,3 and 4 respectively then the least upper bound of $|a-b|^2+|b-c|^2+|c-a|^2$ among the given values is

A. 97

B. 87

C. 90

D. 93

Answer: B

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19. If p^{th}, q^{th}, r^{th} terms of a geometric progression are the positive numbers a,b,c respectively, then the angle between the vectors $\left(\log a^2\right)I + \left(\log b^2\right)j + \left(\log c^2\right)k$ and (q - r) I + (r - p) j + (p - q) k is

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

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

C. $\sin^{-1}\frac{1}{\sqrt{a^2+b^2+c^2}}$

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

Answer: B

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20. The vectors AB = 3i - 2j + 2k and BC = - I - 2k are the adjacent sides of a parallelogram. The angle between its diagonals is

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

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

C. $\frac{3\pi}{4}$ or $\frac{\pi}{4}$

D. $\frac{5\pi}{6}$ or $\frac{\pi}{6}$

Answer: C

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21. Let a and b be two unit vectors. If the vectors c = a + 2b and d = 5a - 4b are perpendicular to each other, then the angle between a and b is

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

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

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

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

Answer: A

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22. If a,b are vectors of lengths a,b respectively then $\left(\frac{a}{a^2} - \frac{b}{b^2}\right)^2$ =

A. $\left(\frac{a+b}{ab}\right)^2$

B. $\left(\frac{a-b}{ab}\right)^2$

C. $\left(\frac{a+b}{ab}\right)$

D. $\left(\frac{a-b}{ab}\right)$

Answer: B

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23. If a.b = 0 and a + b makes an angle of 30° with a, then

A. |b|, = 2 |a|

B. |a| = 2 |b|

C. $|a| = \sqrt{3}|b|$

D. none

Answer: C

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24. If a,b,c are three mutally perpendicular vectors such that |a| = |b| = |c| then find the angle between vector a and (a + b + c) =

A. $\pi/3$

B. $\cos^{-1}(1/3)$

C. $\cos^{-1}(1/\sqrt{3})$

D. $\cos^{-1}(2/3)$

Answer: C

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25. If three unit vectors a,b,c satisfy a + b + c = 0 then the angle between a and b is :

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

B. $\frac{5\pi}{6}$

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

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

Answer: A

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26. In the parallelogram ABCD, $\overline{AC}^2 - \overline{BD}^2$ =

A. $4\overline{AB}$. (orthogonal projection of $\overline{AD}$ on $\overline{AB}$)

B. $2\overline{AB}$. (orthogonal projection of $\overline{AD}$ on $\overline{AB}$)

C. $\overline{AC}$. (orthogonal projection of $\overline{BD}$ on $\overline{AC}$)

D. $2\overline{AC}$. (orthogonal projection of $\overline{BD}$ on $\overline{AC}$)

Answer: A

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27. In the parallelogram ABCD, $\overline{AD}^2 - \overline{AB}^2$ =

A. $4\overline{AB}$. (orthogonal projection of $\overline{AD}$ on $\overline{AB}$)

B. $2\overline{AB}$. (orthogonal projection of $\overline{AD}$ on $\overline{AB}$)

C. $\overline{AC}$. (orthogonal projection of $\overline{BD}$ on $\overline{AC}$)

D. $2\overline{AC}$. (orthogonal projection of $\overline{BD}$ on $\overline{AC}$)

Answer: C

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28. If a,b are unit vectors such that the vector a + 3b is perpendicular to 7a - 5b then the angle between a and b is

A. $\pi/2$

B. $\pi/3$

C. $\pi/4$

D. $\pi/6$

Answer: B

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29. P.T the smaller angle θ between any two diagonals of a cube is given by $\cos\theta = 1/3$

A. $\cos^{-1}(1/\sqrt{3})$

B. $\cos^{-1}(1/3)$

C. $\cos^{-1}(2/3)$

D. $\cos^{-1}\left(\sqrt{2}/3\right)$

Answer: B

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30. The angle between a diagonal of a cube and the diagonal of a face of the cube is

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

B. $\cos^{-1}(1/3)$

C. $\cos^{-1}(2/3)$

D. $\cos^{-1}\left(\sqrt{2}/3\right)$

Answer: D

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31. The cartesian equation of the plane passing through A and perpendicular to $\overrightarrow{AB}$ where 3i + j + 2k, I - 2j + 4k are the position vectorsof A,B respectively

A. [r (3i + j - 2k)]. (2i + 3j + 6k) = 0

B. [r - (3i + j + 2k)]. (2i + 3j + 6k) = 0

C. [r - (3i - j + 2k)]. (2i + 3j + 6k) = 0

D. [r - (3i - j + 2k)]. (2i + 3j - 6k) = 0

Answer: B

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32. The cartesian equation of the plane passing through A and perpendicular to $\overrightarrow{AB}$ where 3i + j + 2k, I - 2j + 4k are the position vectorsof A,B respectively

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

B. $2x - 3y + 6z - 21 = 0$

C. $2x + 3y + 6z + 21 = 0$

D. $2x + 3y - 6z - 21 = 0$

Answer: A

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33. If A = (1,3, - 5) and B = (3,5, - 3) then the vector equation of the plane passing through the midpoint of AB and perpendicular to AB is

A. $r.(I + j + k) = 2$

B. $r. (I + j - k) = 2$

C. $r. (I - j + 4k)$

D. none

Answer: A

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34. The distance between the line $\vec{r} = 2\hat{i} - 2\hat{j} + 3\hat{k} + \text{lambda}\left(\hat{i} - \hat{j} + 4\hat{k}\right)$ and the plane $\vec{r}.\left(\hat{i} + 5\hat{j} + \hat{k}\right) = 5$ is

A. $\frac{10}{9}$

B. $\frac{10}{3\sqrt{3}}$

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

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

Answer: B

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35. The angle between the planes r. (2i - j + 2k) = 3 and r. (3i - 6j + 2k) = 4

A. $\cos^{-1}\left(\frac{16}{21}\right)$

B. $\sin^{-1}\left(\frac{4}{21}\right)$

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

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

Answer: A

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36. The angle between the lies r = (2i - 3j + k) + λ (I + 4j + 3k) and r = (I - j + 2k) + μ (I + 2j - 3k) is

A. $\cos^{-1}\left(\frac{9}{\sqrt{91}}\right)$

B. $\cos^{-1}\left(\frac{7}{\sqrt{84}}\right)$

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

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

Answer: D

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37. The distance from the origin to the plane passing through A and perpendicular to $\overrightarrow{AB}$ where 3i + j + 2k, 5i - j + 3k are the position vectors of A, B respectively is

A. 1

B. 2

C. 3

D. 4

Answer: B

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38. The vector equation of the sphere with centre 3i + 2j - 5k and radius 7 is

A. $[r-(3i+2j-5k)]^2=49$

B. $[r+(3i-2j-5k)]^2=49$

C. $r^2 = (3i + 2j - 5k)^2 + 49$

D. $r^2 = (3i + 2j - 5k)^2 + 7$

Answer: A

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39. The centre and radius of the sphere $r^2 - 2r.\ (3i + 4j - 5k) + 1 = 0$ are

A. 3i + 4j + 5k, 7

B. 3i + 4j - 5k, 1

C. $-3i - 4j + 5k$, 7

D. 3i + 4j - 5k, 7

Answer: D

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40. The centre and radius of the sphere $3x^2 + 3y^2 + 3z^2 - 2x - 12y + 6z + 7 = 0$ are

A. (1,2 - 1), 5

B. (1/3, 2, - 1), 5/3

C. (2/3, 4, -2) 10/3

D. 2/3, 4, - 5/2

Answer: B

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41. The equation of the sphere on the join of (3,4 , -2), (-2, -1, 0) as diameter is

A. $r^2 - r.(I + 3j - 2k) = 10$

B. $r^2 - 2r.(I + 2j - 2k) + 10 = 0$

C. $r^2 - 2r.(I + 2j - 2k) = 10$

D. $r^2 - 2r.(5i + 5j - 2k) + 20 = 0$

Answer: A

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42. The centre of the sphere (r - 3i - 4j + 5k). (r - 21 + 3j - 4k) = 0 is

A. 5i + j - k

B. $\frac{1}{2}$ (5i + j - k)

C. I +7j - 9k

D. $\frac{1}{2}$ (I + 7j - 9k)

Answer: B

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43. Tae radius of the sphere (r - 2i + 3j - k). (r + 3i - j + 2k) = 0 is

A. 5

B. $5\sqrt{2}$

C. $5/\sqrt{2}$

D. $2\sqrt{5}$

Answer: C

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44. The work done by the force F = 2i - 3j + 2k in moving a particle from (3,4,5) to (1,2,3) is

A. 0

B. $3/2$

C. -4

D. -2

Answer: D

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45. The force f = 2i + 2j - k acting at a = I - 2j + k is displaced to a unit distance on z-axis (Oz = 1) direction. The magnitude of the work done is

A. 1

B. 2

C. 3

D. 4

Answer: B

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46. Constant force P = 2i - 5j + 6k and Q = -1 + 2j - k act on a particle. When the particle is displaced from A (4, - 3, -2) to B (6,1, - 3) then the work done is

A. 14 unit

B. -14 unit

C. 15 units

D. -15 unit

Answer: D

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47. A particle acted on by constant forces 4i + j - 3k and 3i + j - k is displaced from the point I + 2j + 3k to the point 5i + 4j + k. The total work done by the forces is

A. 20 unit

B. 30 unit

C. 40 unit

D. 50 unit

Answer: C

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48. If forces of magnitudes 6 and 7 units acting in the direction I - 2j +2k and 2i - 2j - k, I + 2j + 2k and -2i + j - 2k respectively act on a particl which is displaced from P (2, -1, -3) to Q (5, -1, 1) then the work done by the forces is

A. 4

B. -4

C. 7

D. -7

Answer: A

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49. Three forces having magnitude 5,4 and 3 units act on a particle in the directions $2i - 2j + k$, $i + 2j + 2k$ and $-2i + j - 2k$ respectively and the particle gets displaced from the point A whose vector is $6i - 2j + 3k$ to the point whose position vector is $9i + 7j + 5k$. Then the work done by these forces is

A. 9 unit

B. 43 unit

C. 38 unit

D. 38/3 unit

Answer: A

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50. The work done by force $F = ai + j + k$ in moving a particle from (1,1,1) to (2,2,2) along a straight line is 5 unit. Then a =

A. 1

B. 2

C. 3

D. 4

Answer: C

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Exercise 1 B Cross Product Of Vectors

1. If a = I + j + k, b = 2i - 3j + k then $a \times b$ is

A. 4i + j - 5k

B. 4i - j + 5k

C. 4i + j + 5k

D. 4i - j - 5k

Answer: A

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2. If a = 2i - j + k, b = 3i + 4j - k then $|a \times b|$ =

A. 9

B. $3sqt(10)$

C. $\sqrt{155}$

D. $5\sqrt{5}$

Answer: C

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3. If $\left|\overline{P}\right| = 2, |\bar{q}| = 3$ and $(\bar{p}, \bar{q}) = \frac{\pi}{6}$, then find $|\bar{p} \times \bar{q}|^2$

A. 7

B. 9

C. 8

D. 12

Answer: B

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4. If $(a \times b)^2 + (a.\ b)^2 = 144$ and |a| = 4 then |b| =

A. 16

B. 8

C. 3

D. 12

Answer: C

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5. If |a| = 5, |b| = 6, |a.b| = 24 then $|a \times b|$ =

A. $\sqrt{224}$

B. 18

C. $\sqrt{300}$

D. $\sqrt{254}$

Answer: B

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6. u = a - b, v = a + b, |a| = |b| = $\Rightarrow |u \times v|$ =

A. $2\sqrt{16-(a.\,b)^2}$

B. $2\sqrt{16-(a.\,b)^2}$

C. $2\sqrt{4-(a.\,b)^2}$

D. $\sqrt{4-(a.\,b)^2}$

Answer: A

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7. The unit vector perpendicular to each of the vectors 2i - j + k and 3i + 4j - k is

A. $-3i+5j+11k$

B. $\frac{-3i+5j+11k}{\sqrt{155}}$

C. $\frac{-3i+5j+11k}{155}$

D. $\frac{3i-5j+11k}{\sqrt{155}}$

Answer: B

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8. A unit vector perpendicular to 2i + 3j + 4k and 4i - 3j + 2k is

A. $\frac{3i+2j-3k}{\sqrt{22}}$

B. $\frac{3i-2j-3k}{\sqrt{22}}$

C. $\frac{3i-2j+3k}{\sqrt{22}}$

D. none

Answer: A

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9. The unit vector normal to the plane containing a = I - j - k and b = I + j + k is

A. j - k

B. k - j

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

D. $\frac{k-i}{\sqrt{2}}$

Answer: C

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10. A unit vector perpendicular to the plane of a = 2i - 6j -3k, b = 4i + 3j - k is

A. $\frac{4i+3j-k}{\sqrt{26}}$

B. $\frac{2i-6j-3k}{7}$

C. $\frac{3i-2j+6k}{7}$

D. $\frac{2i-3j-6k}{7}$

Answer: C

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11. The number of vectors of unit length perpendicular to the vectors $a = (1, 1, 0)$ and $b = (0, 1, 1)$ is

A. one

B. two

C. three

D. infinite

Answer: B

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12. A unit vector perpendicular to the plane determined by the points P(1, -1, 2) Q (2, 0, -1) and R (0, 2, 1) is

A. $\frac{2i+j+k}{\sqrt{6}}$

B. $\frac{2i+j+k}{3}$

C. $\frac{2i-j-k}{\sqrt{3}}$

D. $\frac{2i-j-k}{3}$

Answer: A

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13. A unit vector normal to the plane through the point I, 2j, 3k is

A. 6i + 3j + 2k

B. I + 2j + 3k

C. $\frac{6i+3j+2k}{7}$

D. $\left|\frac{6i+3j+2k}{7}\right|$

Answer: C

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14. The unit vector orthogonal to a = 2i + 2j + k, b = 3i + 4j - 12k and forming a right handed system with a and b is

A. 28i - 27j - 2k

B. $-28i+27j+2k$

C. $\frac{28i-27j-2k}{\sqrt{1517}}$

D. $\frac{-28i+27j+2k}{\sqrt{1517}}$

Answer: D

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15. If a = 2i + j - 3k, b = 1 - 2j + k then the vector of length $2\sqrt{3}$ and perpendicular to both a and b is

A. I + j + k

B. I - j - k

C. 2i - 2j + 2k

D. 2i - 2j - 2k

Answer: C

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16. The sine of the angle between the vectors I + 3j - 2k, 2i - 4j - k is

A. $3/4$

B. $3/5$

C. $5/6$

D. $5/7$

Answer: D

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17. If θ is th angle between the vector 2i - 2j + 4k and 3i + j + 2k, then sin θ =

A. $2/7$

B. $2/\sqrt{7}$

C. $\sqrt{2}/7$

D. $\sqrt{2/7}$

Answer: B

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18. If a = 2i + 3j + 6k, b = 3i - 6j + 2k, c = 6i + 2j - 3k then $a \times b =$

A. 3c

B. 5c

C. 7c

D. 11c

Answer: C

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19. If 13 a = 3i + 4j + 12k, 13b = 4i - 12j + 3k, 13 c = 12i + 3j - 4k then $a \times b =$

A. c

B. 5c

C. 13c

D. 169 c

Answer: A

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20. If $(2i + 4j + 2k) \times (2i - xj + 5k) = 16i - 6j + 2xk$, then the value of x is

A. 2

B. -2

C. 0

D. none

Answer: B

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21. If a = 2i - 3j - k, b = I + 4j - 2k then (a + b) $\times$ (a - b) =

A. 20i - 6j - 22k

B. $-20i + 6j - 22k$

C. $-20i - 6j - 22k$

D. 20i + 6j - 22k

Answer: C

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22. If a = 3i - j - 2k, b = 2i + 3j + k then (a + 2b) $\times$ (2a - b) =

A. 25i + 35j - 55k

B. 25i - 35j - 55k

C. $-25i - 35j - 55k$

D. $-25i + 35j - 55k$

Answer: D

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23. If a = I + 2j - 3k, b = 2i + j + k, c = I + 3j - 2k then $(a \times b) \times (b \times c)$ =

A. 5 (2i + j + k)

B. $-5(2i + j + k)$

C. 10 (2i + j + k)

D. $-10(2i + j + k)$

Answer: D

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24. $2i \times (3i - 4k) + (I + 2j) \times k$ =

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25. If r = xi + yj + zk then $(r \times i).(r \times j) + xy =$

A. 0

B. 1

C. xy

D. $I \times j$

Answer: A

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26. If |a| = 1, |b| = 2 and the angle between a and b is 120, then $\{(a + 3b) \times (3a - b)\}^2 =$

A. 425

B. 375

C. 325

D. 300

Answer: D

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27. $(a+b) \times c + (b+c) \times a + (c+a) \times b =$

A. 0

B. a + b

C. a - b

D. $a \times b$

Answer: A

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28. If $|a \times b| = |a.\, b|$ then (a,b) =

A. 0

B. π

C. $\pi/2$

D. $\pi/4$

Answer: D

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29. If a and b are unit vectors and $a \times b = 1$, then the angle between a and b is

A. $\pi/4$

B. $\pi/2$

C. $\pi/3$

D. π

Answer: B

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30. If a and b are unit vectors such that $|a \times b| = a.\, b$, then $|a + b|^2$ =

A. 2

B. $2 + \sqrt{2}$

C. $2 - \sqrt{2}$

D. $\sqrt{2}$

Answer: B

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31. If a + b + c = 0 then

A. a.b = b.c = c.a

B. $a \times b = b \times c = c \times a$

C. $a \times b = b.\, c$

D. $a + b = (a \times c) + (b \times c)$

Answer: B

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32. Let a,b,c represent respectively BC, CA and AB where ABC is a triangle.

Then

A. a + b = c

B. b + c = a

C. $a \times b = b \times c = c \times a$

D. none

Answer: C

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33. If a.b = a.c, $a \times b = a \times c$ then

A. a = 0

B. b = c

C. a = 0 or b = c

D. a = 0 and b = c

Answer: C

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34. If a.b = a.c, $a \times b = a \times c$ then

A. a - b is parallel to c

B. a - b is perpendicular to c

C. a + b is parallel to c

D. a -b is perpendicular to c

Answer: A

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35. $a \neq 0, b \neq 0, C \neq 0, a \times b = 0, b \times c \Rightarrow a \times c =$

A. b

B. a

C. 0

D. I + j + k

Answer: C

View Text Solution

36. If $a \times b = b \times c \neq 0$, then a + c =

A. pa where p is scalar

B. pb where p is a scalar

C. pe where p is a scalar

D. none

Answer: B

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37. If $a \times b = c \times d, a \times c = b \times d$ then

A. a - d is parallel to b - c

B. a - b is parallel to c - d

C. a - c is parallel to b - d

D. a + b is parallel to c + d

Answer: A

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38. If a,b,c be unit vectors such that a.b = a.c = 0 and the angle between b and c is $\pi/6$ then a =

A. $\pm(a \times c)$

B. $\pm 2(a \times c)$

C. $\pm(b \times c)$

D. $\pm 2(b \times c)$

Answer: D

Watch Video Solution

39. Let u = I + j, v = I - j, w = I + 2j + 3k. If n a unit vector such that u.n = 0 v.n = 0 then |w.n| =

A. 0

B. 1

C. 2

D. 3

Answer: D

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40. If u and v are unit vectors and θ is the acute angle between them, then $2u \times 3v$ is a unit vector for

A. Exactly two values of θ

B. More than two values of θ

C. No value of θ

D. Eaxctly value of θ

Answer: D

Watch Video Solution

41. If r. a = r.b = r.c = 0 where a,b,c are noncoplannar, then

A. $r \perp c \times a$

B. $r \perp a \times b$

C. $r \perp b \times c$

D. r = 0

Answer: D

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42. If a is any vector then $(a \times i)^2 + (a \times j)^2 + (a \times k)^2$ =

A. a^2

B. $2a^2$

C. $3a^2$

D. $4a^2$

Answer: B

Watch Video Solution

43. If $a \times I + 2a - 5j = 0$ then a =

A. 2i + k

B. I + 2k

C. 2j + k

D. j + 2k

Answer: C

View Text Solution

44. If $\vec{a}$ is a unit vector and $\vec{a} \times \vec{i} = \vec{j}$, then $\vec{a} . \vec{i}$ =

A. 0

B. 1

C. 2

D. 3

Answer: A

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45. If three vectors a,b,c are such that $a \neq 0$ and $a \times b = 2(a \times c), |a| = |c| = 1, |b| = 4$ and the angle between b and c is $\cos^{-1}$ (1/4), then b - 2c = λ a where λ =

A. 4

B. 3

C. 2

D. 1

Answer: A

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46. The vector area of the parallelogram whose adjacent sides are $i + j + k, 2i - j + 2k$ is

A. $3(i + k)$

B. $3(i - k)$

C. $(2i + j - 2k)$

D. $-2i - j - 2k$

Answer: B

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47. The area of the parallelogram whose adjacent sides are 3i + 2j + k and 3i + k is

A. $\sqrt{10}$

B. $10\sqrt{2}$

C. $2\sqrt{10}$

D. 20

Answer: C

Watch Video Solution

48. The vector area of the parallelogram whose diagonals are I + j - k, 2i - j + 2k is

A. $\frac{1}{2}(I + 4j3k)$

B. $\frac{1}{2}(I - 4j + 3k)$

C. $\frac{1}{2}(I + 4j + 3k)$

D. $\frac{1}{2}(I - 4j - 3k)$

Answer: D

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49. The area of the parallelogram whose diagonals are I - 3j + 2k, -I + 2j is

A. $4\sqrt{29}$ sq. unit

B. $\frac{1}{2}\sqrt{21}$ sq. unit

C. $10\sqrt{3}$ sq. unit

D. $\frac{1}{2}\sqrt{270}$ sq. unit

Answer: B

Watch Video Solution

50. The vector area of the rectangle whose adjacent sides are 2i + 3j, 4k is

A. 12i + 8j

B. 12i - 8j

C. $-12i-8j$

D. $-12i+8j$

Answer: B

Watch Video Solution

51. The vector area of the triangle whose adjacent sides are I - 2j + 2k, 3i + 2j - 5k is

A. $\frac{1}{2}(6i + 11j - 8k)$

B. $\frac{1}{2}(6i - 11j + 8k)$

C. $\frac{1}{2}(6i + 11j + 8k)$

D. $\frac{1}{2}(6i - 11j - 8k)$

Answer: C

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52. The area of the triangle whose sides are given by 2i - 7j + k and 4j- 3k is

A. 17

B. $17/2$

C. $17/4$

D. $\frac{1}{2}\sqrt{389}$

Answer: D

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53. The vector area of the triangle with vertices I + j + k, I + j + 2k, I + 2j + k is

A. I + j + k

B. $-i$

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

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

Answer: D

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54. The area of the triangle formed by the points whose position vectors are 3i + j 5i + 2j + k, I - 2j + 3k is

A. $\sqrt{23}$ sq. unit

B. $\sqrt{21}$ sq. unit

C. $\sqrt{29}$ sq. unit

D. $\sqrt{33}$ unit

Answer: C

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55. The area of the triangle with vertices (1,2,3), (2,5,-1), (-1,1,2) is

A. 6 sq. unit

B. $\sqrt{3/2}$ sq. unit

C. $\sqrt{29}$ sq. unit

D. $\frac{1}{2}\sqrt{155}$ sq. unit

Answer: D

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56. The vector area of the ΔABC whose vertices are a,b,c is

A. $\{(a \times b) + (b \times c) + (c \times a)\}$

B. $\frac{1}{2}\{(a \times b) + (b \times c) + (c \times a)\}$

C. $2\{(a \times b) - (b \times c) + (c \times a)\}$

D. none of these

Answer: B

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57. If a,b,c are the position vectors of A,B,C of ΔABC then $(a \times b) + (b \times c) + (c \times a)$ =

A. (1/2) (Area ΔABC)

B. 2 (Area ΔABC)

C. 3 (Area ΔABC)

D. none

Answer: B

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58. If $\left|\vec{a}\right| = \sqrt{3}, \left|\vec{b}\right| = 2, \left(\vec{a}, \vec{b}\right) = \frac{\pi}{3}$, then the area of the triangle with adjacent sides $\vec{a} + 2\vec{b}$ and $2\vec{a} + \vec{b}$ (in sq.u) is

A. $3\sqrt{3}$ sq. unit

B. $9\sqrt{3}$ sq. unit

C. $\frac{9\sqrt{3}}{2}$ sq. unit

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

Answer: C

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59. If the area of the parallelogram whose adjacent sides are $3\vec{i} - 4\vec{j} + \lambda\vec{k}, 2\vec{j} - 4\vec{k}$ is $\sqrt{436}$ sq. units $(\lambda \geq 0)$, then $\lambda =$

A. 0

B. 4

C. 1

D. 3

Answer: A

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60. If a = 2i + 2j + k, a.b = 14, $a \times b$ = 3i + j - 8k then b =

A. 5i + j + 2k

B. 5i - 5j + 2k

C. 5i + 5j - 2k

D. 5i - 5j - 2k

Answer: A

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61. If a = (1,1,1) c = (0,1, -1) are given vectors then a vector b satisfying the equntions $a \times b = c$ and a.b = 3 is

A. 5i + 2j + 2k

B. $\frac{5}{2}I + j + k$

C. $\frac{5}{3}I\frac{2}{3}j + \frac{2}{3}K$

D. $I + \frac{2}{5}j + \frac{2}{5}k$

Answer: C

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62. If a = 2i + k, b = I + j + k, c = 4i - 3j + 7k. The vector r satisfying $r \times b = c \times b$ and r.a = 0 is

A. I +8j + 2k

B. I - 8j + 2k

C. $-1 - 8j + 2k$

D. I - 8j - 2k

Answer: C

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63. The vector c is perpendicular to both a = (1, -2, -1), b = (2, 1, -1) and c also satisfyies $|c \times (I - j + k)| = 2\sqrt{6}$ then c =

A. $\pm(3i - j + 5k)$

B. $\pm(-4i + 5j + k)$

C. $\pm(I + j + k)$

D. none

Answer: A

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64. If a,b are two unit perpendicular vectors and c is a unit vector which is inclined an angle 0 with a and b. if c = $\alpha a + \beta b + \gamma(a \times b)$ and γ^2 =

A. $\cos 2\theta$

B. $-\cos 2\theta$

C. $\sin 2\theta$

D. $-\sin 2\theta$

Answer: B

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65. If a = I + 2j + 3k, b = -I + 2j + k, c = 3i + j and d is normal to both a and b, then (c,d) =

A. $\cos^{-1}\left(\frac{4}{\sqrt{30}}\right)$

B. $\sin^{-1}\left(\frac{4}{\sqrt{30}}\right)$

C. $\cos^{-1}\left(\frac{2}{\sqrt{30}}\right)$

D. $\sin^{-1}\left(\frac{2}{\sqrt{30}}\right)$

Answer: A

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66. If x.a = 0, $x \times b = c \times b$ then x =

A. $c - \frac{c.\,a}{b.\,a}b$

B. $c - \frac{c.\,a}{c.\,b}a$

C. $a - \frac{c.a}{c.b}b$

D. $b - \frac{c.a}{c.b}b$

Answer: A

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67. $r \times a = b \times a, r \times b = a \times b, r \times b = a \times b, \neq 0, b \neq 0, a \neq \lambda b,$ a is not perpendicular to b $\Rightarrow$ r =

A. a - b

B. a + b

C. $a \times b + a$

D. $a \times b + b$

Answer: B

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68. Let a = I + j, b = 2i - k. Then the point of intersection of the lines $r \times a = b \times a$ and $r \times b = a \times b$ is

A. $-I + j + k$

B. 3i - j + k

C. 3i + j - k

D. I - j - k

Answer: C

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69. The perpendicular distance from A (1,4, -2) to the line BC, where B = (2, 1, -2) and C = (0, -5, 1) is

A. $\frac{\sqrt{26}}{7}$

B. $\sqrt{\frac{26}{7}}$

C. $\frac{2\sqrt{26}}{7}$

D. $\frac{3\sqrt{26}}{7}$

Answer: D

View Text Solution

70. The perpendicular distance from the point 3i - 2j + k to the line joining the points I - 3j + 5k, 2i + j - 4k is

A. 7

B. $\sqrt{3}$

C. $2\sqrt{3}$

D. $7\sqrt{3}$

Answer: B

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71. If A (1,2,3), B (2,3,1), C (3,1,2) then the length of the altitude through C is

A. 3

B. $3\sqrt{3}$

C. $3\sqrt{2}$

D. $3/\sqrt{2}$

Answer: D

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72. The torque about the point 2i + j - K of a force represented by 4i + k acting through the point (I - j + 2k) is

A. 2i + 13 j + 8k

B. 2i + 13 j - 8k

C. 2i - 13j + 8k

D. $-2i + 13j + 8k$

Answer: D

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73. A force F = $2i - \lambda j + 5k$ is applied at the point A (1,2,5). If its moment about the point (-1, -2, 3) is 16i - 6j + 2 λ k, then λ =

A. -2

B. -1

C. 0

D. 2

Answer: A

Watch Video Solution

Exercise 1 C Triple Product Of Vectors

1. [I - j j - k k - i] =

A. 0

B. 1

C. -1

D. 2

Answer: A

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2. If a = I + j - k, b = I - j + k, c = I - j - k then $a \times (b \times c)$ =

A. 0

B. 1

C. -1

D. 2

Answer: A

Watch Video Solution

3. The vectors $2i - 3j + k, I - 2j + 3k, 3i + j - 2k$

A. -12

B. 14

C. 10

D. 15

Answer: A

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4. (a + 2b - c) . (a - b) $\times$ (a - b - c) =

A. $-[abc]$

B. 2 [a b c]

C. -2 [a b c]

D. 0

Answer: C

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5. If a is perpendicular to b and c, |a| = 2, |b| = 3, |c| = 4 and the angle between b and c is $2\pi/3$ then [a b c] =

A. 24

B. 12

C. $12\sqrt{3}$

D. $24\sqrt{3}$

Answer: C

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6. If u,v,w are non-coplanar vectors and p,q are real numbers, then the equality [3u pv pw] - [pv w qw] - [2w qv qu] = 0 holds for

A. exactly two values of (p,q)

B. more than two but not all value of (p,q)

C. all values of (p,q)

D. exactly one value of (p,q)

Answer: D

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7. If x,y,z are non-zero real numbers, a = xi + 2j, b = yi + 3k and c = xi + yi + zk are such that $a \times b$ = zi - 3j + k then [a b c] =

A. 10

B. 9

C. 6

D. 3

Answer: B

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8. If $\bar{a}, \bar{b}, \bar{c}$ are mutually perpendicular unit vectors, then find $\left[\bar{a}\bar{b}\bar{c}\right]^2$.

A. 1

B. 0

C. 2

D. 3

Answer: A

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9. The volume of parallelopiped with edges I, I + j, I + j + k is

A. 0

B. 1

C. 2

D. 3

Answer: B

Watch Video Solution

10. The volume of the parallelopiped whose coterminal edges are 2i - 3j + 4k, I + 2j - 2k, 3i - j + k is

A. 5

B. 6

C. 7

D. 8

Answer: C

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11. The volume of the parallelopiped whose edges are represented by 2i - 3j , i + j - k, 3i - k is

A. -1

B. 2

C. 3

D. 4

Answer: D

Watch Video Solution

12. The volume of the parallelopiped with edges (2, -3, 0), (1,1, - 1), (3,0, -1) is

A. 1

B. 4

C. 2

D. 8

Answer: B

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13. If [a b c] = 3, then the volume (in cube units) of the parallelopiped with 2a + b, 2b + c and 2c + a as coteminous edges is

A. 15

B. 22

C. 25

D. 27

Answer: D

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14. The volume of the parallelopiped whose sides are OA = $(\lambda+1)i+\lambda(\lambda+1)j+k, OB=(\lambda+2)i+(\lambda+1)(\lambda+2)j+k, OC=($ is

A. 2

B. 4λ

C. $\lambda+3$

D. none

Answer: A

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15. The volume of the parallelopiped whose sides ae OA = $(\lambda+2)i+(\lambda+2)(\lambda+1)j+k. OB(\lambda+3)I+(\lambda+2)(\lambda+3)j+k$ and OC = $(\lambda+4)i+(\lambda+3)(\lambda+4)j+k$ is

A. 2λ

B. 3λ

C. 4λ

D. 2

Answer: D

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16. Let Oa,Ob,OC be the co-terminal edges of a rectangular parallelopiped of volume V and let P be the vertex opposite to O. Then $[APBPCP]$ =

A. 2V

B. 12V

C. $3\sqrt{3}$ V

D. 0

Answer: A

View Text Solution

17. The volume of the tetrabodron with vertices at (0,0,0), (1,0,0),(0,1,0), (0,0,1) is

A. 1

B. $1/2$

C. $1/3$

D. $1/6$

Answer: D

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18. The volume of the tetrahedron formed by (1,2,3), (4,3,2), (5,2,7),(6,4,8) is

A. $22/3$

B. $11/3$

C. $1/3$

D. $16/3$

Answer: D

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19. The volume of the tetrahedron formed by 4i + 5j + k, - j + k, 3i + 9j + 4k, 4 (-I + j + k) is

A. 7

B. 9

C. 11

D. 13

Answer: C

Watch Video Solution

20. The volume of (in cubic units) of the tetrahedron with edges I + j + k, I - j + k and I + 2j - k is

A. 4

B. $2/3$

C. $1/6$

D. $1/3$

Answer: B

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21. If a,b,c are noncoplanner vectors then $\frac{a.(b\times c)}{(c\times a).B}+\frac{b.(a\times c)}{c.(a\times b)}=$

A. 0

B. 1

C. 2

D. -1

Answer: A

View Text Solution

22. [2+6 -2+7 8-10] =

Watch Video Solution

23. If $(a-\lambda b).(b-2c)\times(c+3a)=0$ then λ =

A. -1

B. -3

C. 6

D. $-1/6$

Answer: D

Watch Video Solution

24. If a.i = 4 then $(a.\ j) \times (2j - 3k)$ =

A. 12

B. 2

C. 0

D. -12

Answer: D

Watch Video Solution

25. $\{a.\ (b \times i)\} + \{a.\ (b \times j)\}j + \{a.\ (b \times k)\}k$ =

A. $2(a \times b)$

B. $3(a \times b)$

C. $(a \times b)$

D. none

Answer: C

View Text Solution

26. $(a+b)\times c+(b+c)\times a+(c+a)\times b=$

A. 0

B. $-[abc]$

C. 2 [a b c]

D. [a b c]

Answer: D

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27. (a - b) . (b - c) $\times$ (c - a) =

A. $(b\times c)$

B. $2a.\ (b \times c)$

C. $3a(b \times c)$

D. 0

Answer: D

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28. C. (b + c) $\times$ (a + b + c) =

A. $c.\ b \times a$

B. 0

C. $c.\ a \times b$

D. $-ac \times b$

Answer: A

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29. If u,v,w are three nonceplannar vectors then (u + v - w), (u - v) $\times$ (v - w) =

A. 0

B. $u.\ v \times w$

C. $u.\ w \times v$

D. $3u.\ V \times w$

Answer: D

View Text Solution

30. If a,b,c are three vectors such that [abc]=5, then the value of [a×bb×cc×a] is

A. 15

B. 20

C. 25

D. 54

Answer: C

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31. If a,b,c are linearly independent, then $\frac{[2a+b2b+c.\ 2c+a]}{[abc]}$ =

A. 9

B. 8

C. 7

D. none

Answer: A

Watch Video Solution

32. If a,b,c are linearly independent, $\frac{(a+2b).(2b+c)\times(5c+a)}{a.(b\times c)}=k$ then k is

A. 10

B. 14

C. 18

D. 12

Answer: D

View Text Solution

33. Let a,b and C be three non - coplanar vectors and let p,q and r be the vectors defined by $p=\frac{b\times c}{[abc]}.\ Q=\frac{c\times a}{[abc]}.\ R\frac{a\times b}{[abc]}$. Then (a + b). P + (b + c) q + (C + a) . R =

A. 0

B. 1

C. 2

D. 3

Answer: D

View Text Solution

34. If the vectors 2i - 3j + 4k, I + 2j - k and xi - j + 2k are coplanar then x =

A. $8/5$

B. $5/8$

C. 0

D. 1

Answer: A

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35. If the vectors 2i - j + k, I + mj. I + j + k are coplannar then the value of m is

A. 1

B. -1

C. -2

D. 2

Answer: C

Watch Video Solution

36. If the three vectors 2i - j + k, I + 2j - 3k and 3i + λ j + 5k are coplanar then λ =

A. 4

B. -4

C. 2

D. 3

Answer: B

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37. If I - 2j, 3j + k and λ I + 3j are coplanar. Then λ=

A. -1

B. $1/2$

C. $-3/2$

D. 2

Answer: C

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38. If I + j + k, I - j, I + 2j + ak are coplanar then a is

A. $3/2$

B. 3

C. -3

D. 0

Answer: A

Watch Video Solution

39. If 3i + 3j + $\sqrt{3}k$, I + k, $\sqrt{3}$ I + $\sqrt{3}\lambda$ k are coplanar, then λ =

A. 1

B. 2

C. 3

D. 4

Answer: A

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40. If a,b,c are non-coplanar vectors and λ is a real number, then the vectors a + 2b + 3c, λb + 4c and $(2\lambda - 1)$ c are non coplanar for

A. all values of λ

B. no value of λ

C. except two values of λ

D. except one value of λ

Answer: C

View Text Solution

41. Let a = I + j + k, b = I - j + 2k and c = xi + (x - 2) j - k. If the vector c lies in the plane of a and b. then x equals

A. 0

B. 1

C. -4

D. -2

Answer: D

View Text Solution

42. Let a = I - 2j + 3k, b = 2i + 3j - k and c = λ I + j + $(2\lambda - 1)$ k. If c is parallel to the plane containing a,b then λ =

A. 0

B. 1

C. -1

D. 2

Answer: A

View Text Solution

43. If the vectors ai + j + k, I + bj + k, I + j + ck $(a \neq b, c \neq 1)$ are coplanar, then the value of $\frac{1}{1-a} + \frac{1}{1-b} + \frac{1}{1-c}$ =

A. 0

B. 3

C. 2

D. 1

Answer: D

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44. Let a,b,c the distinct non-negative numbers. If the vectors ai + aj + ck, I + k and ci + cj + bk lie in a plane, then c is

A. the arthematic mean of then c is

B. the geometric mean of a and b

C. the harmonic mean of a and b

D. equal to zero

Answer: B

Watch Video Solution

45. If a = i + j + k, b = 4i + 3j + 4k, c = i + $\alpha j + \beta k$ are linearly dependent and $|c| = \sqrt{3}$ then

A. $\alpha = 1, \beta = -1$

B. $\alpha = 1, \beta = \pm 1$

C. $\alpha = -1, \beta = \pm 1$

D. $\alpha = \pm 1, \beta = 1$

Answer: D

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46. If the volume of the parallelopiped whose edges are represented by $12i + \lambda k, 3j = k, 2i + j - 15K$ is 546 then λ =

A. 1

B. 2

C. 3

D. 4

Answer: C

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47. If $a = 2i + 3j$, $b = I + j + k$, $c = \lambda I + 4j + 2k$ are the edges of a parallelopiped of volume 2 cubic units, then a value of λ is

A. 1

B. 2

C. 3

D. 4

Answer: D

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48. If the volume of the parallelopiped with eoterminus edges 4i + 5j + k, -j + k and 3i + 9j + pk is 34 cubic units, then the negative value of p =

A. 4

B. -13

C. 13

D. 6

Answer: B

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49. The value of k for which the points A (1,0,3), B (-1,3,4) C (1,2,1) and D(k,2,5) are coplanar is

A. 1

B. 2

C. 0

D. -1

Answer: D

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50. If the points 3i - 2j - k, 2i + 3j - 4k, I + j + 2k, 4i + 5j + λ k are coplanar then λ =

A. 12

B. $-94/7$

C. $3/2$

D. 5

Answer: B

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51. If the volume of the tetrahedron with edges 2i + j -k, I + aj + k and I + 2j - k is one cubic unir then a =

A. 1

B. -1

C. 2

D. -2

Answer: C

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52. The volume of the tetrahedron having the edges I + 2j + k, I + j + k, I - j + λ K as coteninous is 2/3 cubic units. Then λ =

A. 1

B. 2

C. 3

D. 4

Answer: A

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53. If a,b,c,d are the position vectors of A,B,C,D respectively then the volume of the tetrahedron ABCD is

A. $\pm\frac{1}{6}\{[abc]-[abd]+[acd]-[bcd]\}$

B. {[a b c] - [a b d] + [a c d] - [b c d]}

C. $\pm\frac{1}{6}\{[bca]-[cba]+[acd]-[bcd]\}$

D. $\pm\frac{1}{8}\{[bac]-[acd]+[abd]-[bcd]\}$

Answer: A

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54. If d = x $(a\times b)+y(b\times c)+z(c\times a)$ and [a b c] = 1/8, then x + y + z =

A. 8.d (a + b + c)

B. d. (a + b + c)

C. 4d. (a + b + c)

D. none

Answer: A

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55. If a,b,c are non-coplanar vector and λ is a real number then $[\lambda(a+b)\lambda^2 b\lambda c]-[ab+cb]$ for

A. exactly one value of λ

B. no value of λ

C. exactly three values of λ

D. exactly two value of λ

Answer: B

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56. Let a = I - k,k b - xi + j + (1 - x) k and c = yi + xj + (1 + x - y) k. Then [a b c] depends on

A. only y

B. only x

C. both x and y

D. neither x or y

Answer: D

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57. let a be unit vector, b = 2i + j - k and c = I + 3k. The maximum value of [a b c] is

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58. The vectors a + 2b + 3c, 2a + b - 2c, 3a - 7c are

A. coplanar

B. collinear

C. noncoplanar

D. none

Answer: A

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59. The points $2a + 3b - c, a - 2b + 3c, 3a + 4b - 2c, a - 6b + 6c$ are

A. collinear

B. coplanar

C. noncoplanar

D. none

Answer: B

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60. The vectors $5i + 6j + 7k, 7i - 8j + 9k, 3i + 20j + 5k$ are

A. coplanar

B. collinear

C. neocoplanar

D. none

Answer: A

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61. The points (2,1, -1), (1,1,1), (2,2,1), (0,2,5) are

A. coplanar

B. collinear

C. noncoplanar

D. none

Answer: A

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62. Let a = 2i + j + k, b = I + 2j - k and a unit vector c be coplanar. If c is perpendicular to a, then c =

A. $\frac{1}{\sqrt{2}}(-j+k)$

B. $\frac{1}{\sqrt{3}}(-j-j-K)$

C. $\frac{1}{\sqrt{5}}(j-2j)$

D. $\frac{1}{\sqrt{3}}(I-j-k)$

Answer: A

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63. A unit vector coplanar with I + j + 3k and I + 3j + k and perpendicular to I + j + k is

A. $\frac{1}{\sqrt{2}}(j+k)$

B. $\frac{1}{\sqrt{3}}(I-j+k)$

C. $\frac{1}{\sqrt{2}}(j-k)$

D. $\frac{1}{3}(I+j-k)$

Answer: C

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64. The shortest distance between the straight line passing through the point A = (6, 2, 2) and parallel to the vector (1, -2, 2) and the straight line passing through $A^1 = (-4, 0, -1)$ and parallel to the vector (3, -2, -2) is

A. 9

B. 8

C. 5

D. 2

Answer: A

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65. The shortest distance between the line r = (I + 2j + 3k) + t (I + 3j + 2k) and r = (4i +5j + 6k) + t (2i + 3j + k) is

A. 3

B. $2\sqrt{3}$

C. $\sqrt{3}$

D. $\sqrt{6}$

Answer: C

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66. The shortest distance between the line r = 3i + 5j + 7k + λ (I + 2j + k) and r = I - j - k + μ (7i - 6j + k) is

A. $\frac{16}{5\sqrt{5}}$

B. $\frac{26}{5\sqrt{5}}$

C. $\frac{36}{5\sqrt{5}}$

D. $\frac{46}{5\sqrt{5}}$

Answer: D

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67. If A = (1,-2, -1), B = (4, 0, -3) C = (1,2, - 1) and D = (2, -4, -5) then the distance between AB and CD is

A. $2/3$

B. $4/2$

C. $3/2$

D. $5/3$

Answer: B

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68. $(I \times j) \times k + (j \times k) \times I + (k \times i) \times j =$

A. I + k

B. i

C. j

D. 0

Answer: D

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69. $(a \times b) \times c + (b \times c) \times a + (C \times a) \times b =$

A. 0

B. a

C. b

D. c

Answer: A

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70. $a \times (b \times c)$ =

A. (a.b) c = (a.c) b

B. (a.c) b - (a.b) c

C. (c.a) b - (c.b) a

D. (c.b)a - (c.a) t

Answer: B

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71. $a \times (b \times c), b \times (c \times a, c \times (a \times b)$ are

A. coplanar

B. collinear

C. non-coplanar

D. none

Answer: A

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72. If a = 2i + 3j + 5k, b = - I + j + k, c = 4i + 2j + 3k then $(a \times b) \times c =$

A. 8i - 19j - k

B. $-I - 4j + 4k$

C. 7i + 3i - k

D. $-I - 5j - 5k$

Answer: B

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73. If a = I + j - k, b = I - j + k, c = I - j - k then $a \times (b \times c)$ =

A. I - j + k

B. 2i - 2j

C. 3i - j + k

D. 2i + 2j - k

Answer: B

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74. If a = i- 2j + k, b = 2i + j - k, c = 4i + 4j + 3k then $|(a \times b) \times c|$ =

A. $\sqrt{474}$

B. $\sqrt{33}$

C. $\sqrt{74}$

D. $\sqrt{130}$

Answer: A

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75. If a = 2i + 3j - 4k, b = I + j + k and c = 4i + 2j + 3k, then $|a \times (b \times c)|$ =

A. $\sqrt{10}$

B. 1

C. 2

D. $\sqrt{5}$

Answer: D

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76. If a = I + j + k, b = i+ j, c = I and $(a \times b) \times c = \lambda a + \mu b$, then $\lambda + \mu$ =

A. 0

B. 1

C. 2

D. 3

Answer: A

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77. If $\bar{a} = \frac{1}{\sqrt{10}}\left(3\bar{i} + \bar{k}\right)$ and $\bar{b} = \frac{1}{7}\left(2\bar{i} + 3\bar{j} - 6\bar{k}\right)$, then the value of $\left(2\bar{a} - \bar{b}\right).\left[\left(\bar{a} \times \bar{b}\right) \times \left(\bar{a} + 2\bar{b}\right)\right]$

A. 5

B. 3

C. -5

D. -3

Answer: C

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78. $I \times (a \times i) + j \times (a \times j) + k \times (a \times k)$=

A. 3a

B. 2a

C. a

D. 0

Answer: B

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79. $a = I + j - 2k \Rightarrow \sum \{(a \times i) \times j\}^2$

A. $\sqrt{6}$

B. 6

C. 36

D. $6\sqrt{6}$

Answer: B

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80. $[b \times cc \times aa \times b]$ =

A. [a b c]

B. 2 [a b c]

C. $[abc]^2$

D. 0

Answer: C

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81. $(A \times B).\{(B \times C) \times (C \times A)\}$ =

A. $(B + C).\{(C + A) \times (A + B)\}$

B. $\{A.(B \times C)\}^2$

C. $2A.(B \times C)$

D. none

Answer: B

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82. If $[a \times bb \times cc \times a]\lambda[abc]^2$ then λ is equal to

A. 0

B. 1

C. 2

D. 3

Answer: B

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83. $a \times [a \times (a \times b)]$ =

A. $a^2(a \times b)$

B. $a^2(b \times a)$

C. $-a^2(b \times a)$

D. $a.\ (b \times a)$

Answer: B

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84. $(b \times c) \times (c \times a)$ =

A. [a b c] c

B. [a b c] b

C. [a b c] a

D. $a \times (b \times c)$

Answer: A

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85. If a = I + 2j - 3k, b = 2i + j + k, c = I + 3j - 2k then $(a \times b) \times (b \times c)$ =

A. [a b c] a

B. [a b c] b

C. [a b c] c

D. [a b c]

Answer: B

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86. $[(a \times b) \times (a \times c)]. D$ =

A. (a.d) [a b c]

B. (b.d) [a b c]

C. (c.d) [a b c]

D. 0

Answer: A

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87. $a \times \{b \times (C \times a) + (p \times q)\}$ =

A. (a.q) P - (a.p) q + (b.a) $(a \times c) - (b \times c)$

B. (a.q) p - (a.p) q + (b.a) $(a \times c)$

C. $a \times (p \times q) + [abc]c$

D. none of these

Answer: B

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88. If a is a unit vector, $a \times r = b, a.\ r = c, a.\ b = 0$ then r is

A. $ca - a \times b$

B. $b - a \times b$

C. $ca + a \times b$

D. $cb + a \times b$

Answer: A

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89. a,b are non-zero vectors, c is given non-zero scalar such that a is perpendicular to b. Then the vector x satisfying the equaitons a. x = c and $a \times x = b$ is

A. $ca - (a \times b)$

B. $ca - \frac{a \times b}{|a|^2}$

C. $\frac{ca - (a \times b)}{|a|^2}$

D. $\frac{ca}{|a|^2} - (a \times b)$

Answer: C

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90. If a and b are two non-zero perpendicular vectors, then a vector y satisfying equations a. y = c (c scalar) and $a \times y = b$ is

A. $|a|^2(ca - (a \times b))$

B. $|a|^2(ca + (a \times b))$

C. $\frac{1}{|a|^2}(ca - (a \times b))$

D. $\frac{1}{|a|^2}(ca + (a \times b))$

Answer: C

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91. The vectors $\vec{a}$ and $\vec{b}$ are not perpendicular and $\vec{c}$ and $\vec{d}$ are two vectors satisfying $\vec{b} \times \vec{c} = \vec{b} \times \vec{d}$ and $\vec{a} . \vec{d} = 0$. Then the vector $\vec{d}$ is equal to

A. $b + \left(\frac{b . c}{a . b}\right) c$

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

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

D. $c + \left(\frac{a . c}{a . b}\right) b$

Answer: B

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92. If a,b,c are nonzero vectors, then $(a \times b) \times c = a(b \times c)$ iff $(a \times c) \times b =$

A. a + b

B. 0

C. a

D. b

Answer: B

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93. If a,b,c are three unit vectors such that $a \times (b \times c) = \frac{1}{2}b$ then the angles between a,b and a,c are

A. $90^\circ . 90^\circ$

B. $90^\circ . 60^\circ$

C. $60^\circ . 90^\circ$

D. $60^\circ . 30^\circ$

Answer: B

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94. Let a.b and c be non-zero vectors such that $(a \times b) \times c = \frac{1}{3}|b||c|a$. If θ is the acute angle between the vectors b and c then sin θ =

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

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

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

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

Answer: B

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95. If $(a \times b) \times c = a \times (b \times c)$. Where a,b and c are any three vectors such that $a.\ b \neq 0, b.\ c \neq 0$ then a and c are

A. perpendicular

B. parallel

C. inclined at an angle of $\pi/3$ between them

D. inclined at an angle of $\pi / 6$ between them

Answer: B

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96. If $\vec{a}$ and $\vec{b}$ are unit vectors, then the vectors $\left(\vec{a}+\vec{b}\right) \times \left(\vec{a} \times \left(\vec{b}\right)\right.$ is parallel to the vector.

A. $\vec{a} . \vec{b}$

B. $\vec{a} \vec{b}$

C. $\vec{a}-\vec{b}$

D. $2 \vec{a}+\vec{b}$

Answer: C

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97. $(a \times b).(a \times c)$ =

A. (a.c) (b.c) - (a.b) (b.c)

B. (a.b) (b.c) - (a.b) (a.b)

C. (a.a) (b.c) - (a.b). (a.c)

D. (a.a) (b.b) - (a.b) (a.c)

Answer: C

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98. If $a \times b = c \times d, a \times c = b \times d$ then

A. 0

B. |a + b + c|

C. [a b c]

D. (a.b) (c.d)

Answer: A

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99. [d b c] a + [a d c] b + [a b c] c =

A. [a b c]

B. [a b c] d

C. d

D. 0

Answer: B

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100. If the four vectors a,b,c,d are coplanar, then $(a \times b) \times (c \times d)$ =

A. 1

B. a

C. b

D. 0

Answer: D

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101. If a = I + j + k, b = I + j - k, c = I - j + k, d = I - j - k then $(a \times b).(c \times d)$ =

A. 0

B. 1

C. 2

D. 3

Answer: A

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102. If a = 2i + j - 3k, b = I - 2j + k, c -I + j - 4k, d = I + j + k then $(a \times b) \times (c \times d)$ =

A. $5\sqrt{114}$

B. $\sqrt{114}$

C. $5\sqrt{134}$

D. $\sqrt{134}$

Answer: A

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103. The vector equation of a straight line passing through $\bar{a}$ and perpendicular to $\bar{b}$ and $\bar{c}$ is

A. $r - a = (b \times c)$

B. $r = a \times (b \times c)$

C. $r - b = t(a \times c)$

D. $r = b \times (a \times c)$

Answer: A

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104. The perpendicular distance of the point c from the line joining a and b is

A. $\frac{|b \times c + c \times a + a \times b|}{|b - a|}$

B. $\frac{|b \times c - c \times a + a \times b|}{|b - a|}$

C. $\frac{|b \times c + c \times a - a \times b|}{|b - a|}$

D. $\frac{|b \times c - c \times a - a \times b|}{|b - a|}$

Answer: A

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105. If a,b,c,d are four vectors then $(A \times b) \times (C \times d)$ =

A. [a d c] a - [b c a] a

B. [a c d] b - [b c d] a

C. [a c b] c - [b c d] c

D. [a c d] b - [b a d] c

Answer: B

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106. If the vectors b, c, d are not coplanar, then the vector $(a \times b) \times (c \times d) + (a \times c) \times (d \times b) + (a \times d) \times (b \times c)$ is

A. [b c d]a

B. 2 [b c d] a

C. $-[bcd]a$

D. $-2[bcd]a$

Answer: D

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107. a.a' + b.b' + c.c' =

A. 0

B. 1

C. 2

D. 3

Answer: D

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108. a.b' + b.c' + c.a' =

A. 0

B. 1

C. 2

D. 3

Answer: A

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109. [a b c] [a' b' c'] =

A. 0

B. 1

C. 2

D. 3

Answer: B

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110. (a + b). A' + (b + c). B' + (c + a). C' =

A. 0

B. 1

C. 2

D. 3

Answer: D

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111. If a,b,c are three non-coplanar vectors and if r is any vector then r =

A. (r.a') a + (r.b') b + (r. c') c

B. (r.c') a + (r. b') b + (r. a') c

C. (r. a') a - (r. b') b - (r. c') c

D. (a.a') a + (b. b') b + (c. c') c

Answer: A

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112. $a' \times b' + b' \times c' + c' \times a' =$

A. $\frac{a+b+c}{[abc]}$

B. $\frac{a-b-c}{[abc]}$

C. $\frac{a+b+c}{[bac]}$

D. $\frac{a+b+c}{2[abc]}$

Answer: A

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Exercise 2 Special Type Questions Set A

1. I : The vector $6i + 2j + k$, $2i - 9j + 6k$ are mutually perpendicular.

II : The vectors $I + 2j -$, $2i + j + k$ are mutually perpendicular

A. only I is ture

B. Only II is ture

C. both I and II are true

D. Neither I nor II are true

Answer: A

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2. I : If the vectors $a = (1, x, -2)$, $b = (x, 3, -4)$ are mutually perpendicular, then $x = 2$

II : If $a = I + 2j + 3k$, $b = - I + k$, $c = 3i + j$ and $a + b$ is perpendicular to c then $t = 5$.

A. only I is ture

B. Only II is ture

C. both I and II are true

D. Neither I nor II are true

Answer: B

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3. I : If |a + b| = |a - b| then (a,b) $= \pi / 2$

II : If a,b, a+ b are unit vectors then (a,b) $= 2\pi / 3$

A. only I is ture

B. Only II is ture

C. both I and II are true

D. Neither I nor II are true

Answer: C

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4. If |a.b| = $|a \times b|$ then (a,b) $= \pi/4$

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5. I : If |a + b| = |a - b| then $|a \times b| = 0$

II : $(a \times b)^2 + (a.\, b)^2 = |a|^2 |b|^2$

A. only I is ture

B. Only II is ture

C. both I and II are true

D. Neither I nor II are true

Answer: B

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6. I : If (a + b) c = (a - b) c = 0 then $(a \times b) \times c = 0$

II : If $a \times (b \times c)$ is a vector perpendicular to a,b,c

A. only I is ture

B. Only II is ture

C. both I and II are true

D. Neither I nor II are true

Answer: A

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7. I : For any vector a, $(a \times i)^2 + (a \times j)^2 + (a \times k)^2 = 2a^2$ and $(a.\, i)^2 + (a.\, j)^2 + (a.\, k)^2 = a^2$

II : If (2i + 4j + 2k) $\times$ (2i - xj + 5k) = 16 I - 6j + 2xk then x = 2

A. only I is ture

B. Only II is ture

C. both I and II are true

D. Neither I nor II are true

Answer: A

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8. Statement I : If a and b are any two vectors, then $|a \times b|^2 + |a.\, b| = |a|^2 |b|^2$

Statement II : If a and b any two vectors then $|a \times b|^2 = \begin{matrix} a.\, a & a.\, b \\ b.\, a & b.\, b \end{matrix}$. Then

A. Both statement are true and II is a correct explanation of I

B. Both statements are true, but II is not a correct explanation of I

C. I is true and II is false

D. I is false and II is true

Answer: A

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9. I : If a = I +j - k, b = 2i - 3j + 2k, c = 13 I - 7j + 3k then [a b c] = 0

II : If a,b,c are mutually perpendicular unit vector then $[abc]^2 = 1$

A. only I is ture

B. Only II is ture

C. both I and II are true

D. Neither I nor II are true

Answer: C

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10. The volume of the parallelopiped with edges 2i - 4j + 5k, I - j + k, 3i - 5j + 2k is -8

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11. If the vectors 2i -- 3j + 4k, I + 2j - k, xi - j + 2k are coplanar then x = 8/5

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12. I : $I \times (a \times i) + j \times (a \times j + k \times (a \times k) = 2a$

II : $I \times [(a \times b) \times i) + j \times [(a \times b) \times j) + k \times [(a \times b) \times k) = 0$

A. only I is ture

B. Only II is ture

C. both I and II are true

D. Neither I nor II are true

Answer: A

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13. I : If a,b,c,d are four vectors then [b c d] a + [c a d] b + [a b c] c = [a b c]d

II : The points with position vectors a,b,c,d are coplanar then

[a b d] + [b c d] + [c a d] = [a b c]

A. only I is ture

B. Only II is ture

C. both I and II are true

D. Neither I nor II are true

Answer: C

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Exercise 2 Special Type Questions Set B

1. The value of a.b where a = 2i - 3j -k, b = 3i + 2j - 2k

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2. Arrange the value of $|a + b + c|$ in ascending order

(A) If a,b,c are mutually perpendicular unit vectors

(b) If a,b,c are vectors of lengths 2,3,4 respectively and if a,b,c are perpendicular to b + c, c + a , a+ b respectively.

If a,b,c are vector of length 4,4,5 respectively and a,b,c are perpendicular to b + c, c + a, a + b respectively.

A. A,B,C

B. C,B,A

C. B,C,A

D. B,A,C

Answer: A

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3. Arrange the following angles in ascending order

(A) Angle between the vectors I + 3j + 4k and I - 3j + 2k

(B) Angle between the planes r. (2i - j + k) = 7 and r. (I + j + 2k) = 11

(C) Angle between the lines r = x(I + 2j + 2k) and r = t(3i + 2j + 6k)

A. A,B,C

B. C,B,A

C. B,C,A

D. B,A,C

Answer: B

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4. Arrange the magnitudes of following vectors in ascending order

(A) $I \times j + j \times k + k \times i$

(B) If |a| = 2, |b| = 3, (A,b) = 45° then $a \times b$

(C) (2i - 3j + 2k) $\times$ (3i - j + 4k)

A. A,B,C

B. C,B,A

C. B,C,A

D. B,A,C

Answer: A

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5. Arrange the following in ascending order of magnitude

(A) Area of parallelogram with adjacent sides I + 2j + 3k, 3i 2j + k

(B) Area of parallelogram with diagonals I + 2j 3k, 3i - 2j + k

(C) Area of parallelogram with diagonals are 3i + j - 2k, i - 3j + 4k

(D) Area of parallelogram whose sides are 3i + j - 2k, i - 3j + 4k

A. B,A,C,D

B. D,A,C,B

C. D,C,A,B

D. B,C,A,D

Answer: D

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6. find Area of the triangle with sides 3i - 7j + k, 4j - 3k

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7. The ascending order of the following

(A) volume of the tertrahedron formed by 4i + 5j + k. - j + k. 3i + 9j + 4k, -4i + 4j + 4k

(B) Volume of the parallelopiped with edges 2i + 3j + 4k. I + 2j - 2k, 3i - j + k

(C) $|a \times (b \times c)|$ where a = 2i + 3j - 4k, b = i j + k, c = 4i + 2j + 3k

(D) $|(a \times b) \times c|$ where a = i - 2j + k, b = 2i + j - k, c = 4i + 2j + 3k

A. A,B,C,D

B. A,D,B,C

C. A,C,B,D

D. C,B,A,D

Answer: D

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8. Set the following vectors in the increasing order of their magnitudes. a) 3i+4j b) 2i+4j+6k c)2i+2j+2k

A. b,a,c

B. c,a,b

C. a,c,b

D. a,b,c

Answer: A

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9. Arrange the following in the descending order of magnitude (A)

$[I \times jj \times kk \times i]$

(B) [I + jj + k k + i]

(C) $(I \times j)(j \times k)$

(D) $(K \times j)(k \times j)$

A. B,A,C,D

B. B,A,D,C

C. D,C,B,A

D. B,C,A,D

Answer: A

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Exercise 2 Special Type Questions Set C

1.

I. The angle between the vectors$2i. \ + j - kI - 4j - 2k$

II. The angle between the vectors$I + 2j - k2i + j + k$

III. The angle between a.b if a.b if a.b.a + b are unit vector

IV. The angle between$\overrightarrow{AC}\overrightarrow{BD}$ if $A = (1.1.0)B = (1. \ - 1.0)C = (\ - 1.1$

A. a,c,c,b

B. d,c,c,b

C. c,a,b,d

D. d,c,c,a

Answer: B

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2.

I. Projection of $I-2j+k$ on $4i-4j+7k$	$a.\ 9$
II. Projection of $2i-3j+k$ on $4i-4j+7k$	$b.\ 3$
III. projection of $9I-7j+k$ on x-axis	$c.\ 19/9$
IV. Projection of $2i-3j+6k$ on $I+2j+2k$	$d.\ 8/3$

A. b,d,c,a

B. c,b,a,c

C. a,d,c,b

D. c,b,a,d

Answer: D

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3.

sphere	centre
$I.\ r^2 - 2r(3i + 4j - 5k) + 1 = 0$	$a.\ i + j + k$
$II.\ (r - 3i + 2j - 5k).\ (r + i + j + 3k) = 0$	$b.\ 3i + 4j - 5k$
$III.\ i^1 + y^2 + z^2 - 6x + 2y - 4x - 1 = 0$	$c.\ 3i + 2j - 5k$
$IV.\ (r - 3i - 2j + 5k)^2 = 49$	$d.\ 3i - j + 2k$

A. b,a,d,c

B. d,b,c,a

C. c,a,d,b

D. a,d,b,c

Answer: A

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4.

I. Unit vector perpendicular to the plane of$2i - 6j - 3k.\ 4i + 3j - k$

II. Unit vector perpendicular to the plane determined by the points$(1.\ -$

III. Vector perpendicular to the plane of$i - j - k.\ i + j + k$

IV. Vector of length 5 and perpendicular to both$a = 2i + j - 3k$

A. a,c,d,b

B. b,a,d,c

C. a,d,c,b

D. d,c,b,a

Answer: D

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5.

I. If$a = 2i - 3j - k.\ b = i + 4j - 2k$then$(a + b) \times (a - b)$	*a*. $42i + 1$
II. If$a = 3i - j - 2k.\ b - 2i + 3j + k$then$(a + 2b) \times (2a - b)$	*b*. $-5i +$
III. If$a = i + 2j - 3k.\ b = 2i + j + k$then$a \times b$	*c*. $-25i +$
IV. If$a = 2i + 3j + 6k.\ b = 3i - 6j + 2k$then$a \times b$	*d*. $-20i -$

A. a,c,d,b

B. b,a,d,c

C. a,d,c,b

D. d,c,b,a

Answer: D

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6.

$I. \lvert a \times b + b \times c + c \times a \rvert$	$a.$ Area of ΔABC
$II. \ \lvert AB \times cd + BC \times AD + CA \times BD$	$b.\ 2 \times$ Area of ΔABC
$III. \lvert (a - c) \times (b - d) \rvert$	$c.\ 4 \times$ Area of ΔABC
$IV. \frac{1}{2} \lvert (a - b) \times (b - c) \rvert$	$d.\ 2 \times$ Area of quandrilateral A
	$e.$ none

A. a,c,c,b

B. b,a,c,c

C. a,d,c,b

D. b,c,c,a

Answer: D

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7. `{:(I."Area of the parallelogram with diagonals" 3i + j - 2k. i - 3j + 4k, a. (sqrt(569))/(4)), (II. "Area of the triangle whose adjacent sides are" 3i + 4j "and" i - 3j + 4k, b. (2)/(sqrt(14))),(III. "Volume of parallelopiped whose edges are" 2i - 3j. i + j - k. 3i - k, c. 5 sqrt(3)),(IV. "Projection of" 2i + 3j - 2k "in the direction of" i + 2j + 3k, d. 4),(, e. 2//3)):}"

A. c,a,d,b,

B. c,a,c,b

C. a,c,d,b

D. d,a,c,b

Answer: A

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8.

I. The points$i+j+k$. $4i+3j$and$10i+7j-2k$are	a. $a \times b = 7$
II. The vectors$5i+5j+7k$. $7i-8j+k$and$i-20j-5k$are	b. collincar
III. $a=2i+3j+6k$. $b=3i-6j+2k$	c. non-coplar
IV. The Points$2i-j+k$. $i-3j=5k$and$3i-4j-4k$are	d. vertices of
	e. vertices of

A. b,c,a,e

B. a,c,d,e

C. a,c,b,e

D. e,d,c,a

Answer: A

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$[a \times bb \times cc \times a]$	a. 5
II. $[a+bb+cc+a]$	b. 1
III. $[abc][a'b'c']$	c. $[abc]^2$
IV. $[a-bb-cc-a]$	d. 0
	e. $2[abc]$

9.

A. c,c,b,d

B. c,c,d,b

C. b,c,d,a

D. b,a,c,d

Answer: A

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10. Observe the following list

List-I	List-II
$A.\ \left[\vec{a}\ \vec{b}\ \vec{c}\right]$	$1.\ \left\lvert\vec{a}\right\rvert\left\lvert\vec{b}\right\rvert\cos\left(\vec{a}.\ \vec{b}\right)$
$B.\ \left(\vec{c}\times\vec{a}\right)\times\vec{b}$	$2.\ \left(\vec{a}.\ \vec{c}\right)\vec{b}-\left(\vec{a}.\ \vec{b}\right)\vec{c}$
$C.\ \vec{a}\times\left(\vec{b}\times\vec{c}\right)$	$3.\ \vec{a}.\ \vec{b}\times\vec{c}$
$D.\ \vec{a}.\ \vec{b}$	$4.\ \left\lvert\vec{a}\right\rvert\left\lvert\vec{b}\right\rvert$
	$5.\ \left(\vec{b}-\vec{c}\right)\vec{a}-\left(\vec{a}.\ \vec{b}\right)\vec{c}$

Then the correct match for List-I from list II is

A. 1,2,3,4

B. 3,5,2,1

C. 3,2,5,1

D. 2,3,4,1

Answer: B

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11. If a = I + j +k, b = I - j + k, c = I + j - k, d = I - j - k, then observe the following list.

List-I	List-II
$i.\ a.\ b$	$A.\ -1$
$ii.\ b.\ c$	$B.\ 4$
$iii.\ [abc]$	$C.\ 1$
$iv.\ b \times c$	$D.\ 2j - 2k$
	$E.\ 2j + 2k$

The correct match of List-I to List-II:

A. C,A,B,E

B. C,A,B,E

C. A,C,B,E

D. A,C,E,D

Answer: B

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12. a = 2i - 3j, b = I + j - k, c = 3i - k, Match the following

List-I	List-
$i.\ [abc]$equals	$a.\ \frac{2}{3}$
$ii.\ [b+cc+aa+b]$	$b.\ 16$
$iii.\ [b\times cc\times aa\times b]$equals	$c.\ 8$
$iv.$ volume of the tetrahedron for which a.b.c are coterminus edges is	$d.\ 4$

A. 1 $\rightarrow$ d, ii $\rightarrow$ c, iii $\rightarrow$ b, iv $\rightarrow$ a

B. I $\rightarrow$ b, ii $\rightarrow$ c, iii $\rightarrow$ a, iv $\rightarrow$ d

C. I $\rightarrow$ c, ii $\rightarrow$ d, iii $\rightarrow$ a, iv $\rightarrow$ b

D. I $\rightarrow$ d, ii $\rightarrow$ b, iii $\rightarrow$ c, iv $\rightarrow$ a

Answer: A

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Exercise 2 Special Type Questions Set D

1. A : Angle between the vectors I - 2j + k, 2i - j - k is $\frac{\pi}{3}$.

R : If θ is the angle between a,b then cos $\theta = \frac{a.\,b}{|a||b|}$

A. both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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2. A : Length of projection of 2i - 3j + k along 4i - 4j + 7k is 3

R : Length of projection of b on a is $\frac{a.\,b}{|b|}$

A. both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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3. A : If |a| = 13, |b| = 19, |a + b| = 24 then |a -b| = 20

R: for any vectors a,b, $|a+b|^2+|a-b|^2=2\left(|a|^7+|b|^2\right)$

A. both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: C

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4. A : The vector equation of the plane which is at a distance of 5 unit from origin and perpendicular to $2i - j + 2k$ is $r.(2i - j + 2k) = 15$

R : The vector equation of the plane which is at distance of p from origin and perpendicular to the unit vector n is $r.n = p$

A. both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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5. A : The vector equation of the plane passing through the point (2,-1,-4) and perpendicular to the vector $4i - 12j - 3k$ is $[r - (2i - j - 4k)].(4i - 12j - 3k) = 0$

R : the vector equation of the plane passing through the point a and perpendicular to the vector m is (r - a) m = 0

A. both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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6. Let $a = a_1 I + a_2 + a_3 k.$

Assertion (A) : The identity $|a \times i|^2 + |a \times j|^2 + |a \times k|^2 = 2|a|^2$ hold for a,

Reason (R) :

$a \times I = a_3 j = a_2 k, a \times j = a_1 k - a_3 I, a \times k = a_2 I = a_1 j$

Which of the following is correct?

A. both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A

View Text Solution

7. A : A vector perpendicular to both I + j + k and 2i + j + 3k is 2i - j - k

R : Every vector perpendicular to plane containing a,b is equal to $a \times b$

A. both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: C

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8. A : Area of the parallelogram whose adjacent sides are 3i + 2j + k, 3i + k is $\sqrt{10}$

R : Area of quadrilateral ABCD is $\frac{1}{2}|AC \times BD|$

A. both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: D

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9. A : The perpendicular distance from (1,4 -2) to the line joining (2,1,-2) (0,-5,1) is $3\sqrt{26}/7$

R : The perpendicular distance from a point P to the line joining the point A,B is $\frac{\left|\overrightarrow{AP} \times \overrightarrow{AB}\right|}{\left|\overrightarrow{AB}\right|}$

A. both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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10. A : If a,b,c are vectors such that [a b c] = 4 then $[a \times bb \times cc \times a]$ = 64

R : $[a \times bb \times cc \times a] = [abc]^2$

A. A,R are true, R is correct explanation of A

B. A, R are true, R is not correct explanation of A

C. A is correct R is false

D. A is false R is true

Answer: D

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11. A : If a = I - j + k, b = I - 2j - k and c = 2i + pj + 5k are coplanar then p = -1/2

R: vectors a,b,c are coplanar if [a b c] = 0

A. A,R are true, R is correct explanation of A

B. A, R are true, R is not correct explanation of A

C. A is correct R is false

D. A is false R is true

Answer: A

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12. A : The vector equation of the plane passing through I + j + k and parallel to the vectors 2i + 3j - k, I + 2j + 3k is [r - (I + j + k) 2i + 3j - k I + 2j + 3k] = 0

R : The vector equation of the plane passing through the point a and parallel to the vectors b,c is [r - a b c] = 0

A. A,R are true, R is correct explanation of A

B. A, R are true, R is not correct explanation of A

C. A is correct R is false

D. A is false R is true

Answer: A

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13. A : The vector equation of the plane passing through the point (1,-2, 5), (0, -5, -1), (-1,5,0) is [r - (I - 2j +5k) -I - 3j - 6k -2i + 7j -6k] = 0

R : The vector equation of the plane passing through the points a,b,c is [r - ab - a c - a] = 0

A. A,R are true, R is correct explanation of A

B. A, R are true, R is not correct explanation of A

C. A is correct R is false

D. A is false R is true

Answer: A

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14. A : If A = (1, -2, -1) B = (4, 0, - 3), C = (1,2 - 1), d = (2, -4,-5) then the distance between AB and CD is 4/3

R : The shortest distance between the skew lines r = a + sb, r = c + td is $\frac{[a-cbd]}{|b \times d|}$

A. A,R are true, R is correct explanation of A

B. A, R are true, R is not correct explanation of A

C. A is correct R is false

D. A is false R is true

Answer: A

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