MATHS

BOOKS - MTG WBJEE MATHS (HINGLISH)

VECTOR ALGEBRA

Wb Jee Workout Single Option Correct Type 1 Mark

1. The non-zero vectors $\vec{a}, \vec{b}, \vec{c}$ are related by $\vec{a} = 8\vec{b}$ and $\vec{c} = -7\vec{b}$. The angle between is $\vec{a}$ and $\vec{c}$ is

A. θ

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

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

D. π

Answer: D

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2. If $\vec{a} = 2\hat{i} + 3\hat{j} - 5\hat{k}$, $\vec{b} = m\hat{i} + n\hat{j} + 12\hat{k}$ and $\vec{a} \times \vec{b} = \vec{0}$,

then (m,n) =

A. $\left(\frac{-24}{5}, \frac{-36}{5}\right)$

B. $\left(\frac{-24}{5}, \frac{36}{5}\right)$

C. $\left(\frac{24}{5}, \frac{-36}{5}\right)$

D. $\left(\frac{24}{5}, \frac{36}{5}\right)$

Answer: A

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3. If $\vec{C}$ is the midpoint of $\overrightarrow{AB}$ and $\vec{P}$ is any point outside $\overrightarrow{AB}$, then $\overrightarrow{PA} + \overrightarrow{PB} =$

A. $\overrightarrow{PC}$

B. $\overrightarrow{2PC}$

C. $\overrightarrow{-PC}$

D. $\overrightarrow{2OP}$

Answer: B

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4. If $\vec{a} = 2\hat{i} + 2\hat{j} + 3\hat{k}$, $\vec{b} = -\hat{i} + 2\hat{j} + \hat{k}$ and $\vec{c} = 3\hat{i} + \hat{j}$, then $\vec{a} + t\vec{b}$ is perpendicular to $\vec{c}$, if t is equal to

A. 2

B. 4

C. 6

D. 8

Answer: D

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5. If the origin and the points P(2, 3, 4),Q(1, 2, 3) and R(x, y, z) are co-planar, then

A. $x - 2y - z = 0$

B. $x + 2y + z = 0$

C. $x - 2y + z = 0$

D. $2x - 2y + z = 0$

Answer: C

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6. If the position vectors of vertices of triangle ABC are $3\hat{i}+\hat{j}+2\hat{k}, \hat{i}-2\hat{j}+7\hat{k}$ and $-2\hat{i}+3\hat{j}+5\hat{k}$, then the triangle ABC is

A. right angled and isosceles

B. right angled but not isosceles

C. isosceles but not right angled

D. equilateral

Answer: D

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7. A person goes 2 km east, then 3 km north, then 4km west and then 1 km north, starting from the origin. This point is taken as vector $\vec{A}$. The vector $\vec{B}$ such that $3\vec{A}+5\vec{B}=(9,32)$, is

A. (4, 3)

B. (-3, 4)

C. (-4, 3)

D. (3, 4)

Answer: D

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8. The value of $\frac{\left(\vec{a} \times \vec{b}\right)^2 + \left(\vec{a} . \vec{b}\right)^2}{2\left|\vec{a}\right|^2\left|\vec{b}\right|^2}$ is

A. $1/2$

B. $3/2$

C. $5/2$

D. $4/3$

Answer: A

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9. For any vector $\vec{\alpha}$, what is $\left(\vec{\alpha}.\hat{i}\right)\hat{i}+\left(\vec{\alpha}.\hat{j}\right)\hat{j}+\left(\vec{\alpha}.\hat{k}\right)\hat{k}$ equal to ?

A. 0

B. $\vec{a}$

C. $2\vec{a}$

D. $3\vec{a}$

Answer: B

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10. If the triangle with vertices at $2\hat{i}+\hat{j}, 2\hat{j}+\hat{k}, m\hat{k}+\hat{i}$ has centroid $\hat{i}+\hat{j}+\hat{k}$, then m =

A. 1

B. -1

C. 2

D. 3

Answer: C

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11. If $\vec{a}, \vec{b}, \vec{c}$ are the position vectors of points A, B, C respectively such that $5\vec{a}-3\vec{b}-2\vec{c}=\vec{0}$, then

A. C divides BA internally in ratio 5 : 3

B. C divides BA externally in ratio 5 : 3

C. C divides AB internally in ratio 5 : 3

D. C divides AB externally in ratio 5 : 3

Answer: B

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12. Let $\vec{u}, \vec{v}, \vec{w}$ be such that $\vec{u} + \vec{v} + \vec{w} = 0$. If $\left|\vec{u}\right| = 3, \left|\vec{v}\right| = 4, \left|\vec{w}\right| = 5,$ then $\vec{u} . \vec{v} + \vec{v} . \vec{w} + \vec{w} . \vec{u} =$

A. 47

B. 25

C. -25

D. -47

Answer: C

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13. If $3\hat{i}+\hat{j}-2\hat{k}$ and $\hat{i}-3\hat{j}+4\hat{k}$ are the diagonals of a parallelogram, then the area of the parallelogram is

A. $10\sqrt{3}sq.\ units$

B. $5\sqrt{3}sq.\ units$

C. $5\sqrt{2}sq.\ units$

D. $10\sqrt{2}sq.\ units$

Answer: B

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14. Let P, Q, R, S be points on the plane with position vectors $-2\hat{i}-\hat{j}, 4\hat{i}, 3\hat{i}+3\hat{j}, -3\hat{i}+2\hat{j}$ respectively. The quadrilateral PQRS must be a

A. parallelogram, which is neither a rhombus nor a rectangle

B. square

C. rectangle, but not a square

D. rhombus, but not a square

Answer: A

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15. $\overrightarrow{OA}$ and $\overrightarrow{BO}$ are two vectors of magnitudes 5 and 6 respectively. If $\angle BOA = 60^\circ$, then $\overrightarrow{OA}.\overrightarrow{OB}$ is equal to

A. 0

B. 15

C. -15

D. $15\sqrt{3}$

Answer: B

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16. The points $7\hat{i} - 11\hat{j} + \hat{k}, 5\hat{i} + 3\hat{j} - 2\hat{k}$ and $12\hat{i} - 8\hat{j} - \hat{k}$ forms

A. equilateral Δ

B. isosceles Δ

C. right angled Δ

D. collinear

Answer: C

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17. Find the area of triangle if position vector of vertices w.r.t. O is $-\hat{i} + 2\hat{j} + 3\hat{k}, 2\hat{i} - \hat{j} - \hat{k}, \hat{i} + \hat{j} - \hat{k}$.

A. $\frac{\sqrt{89}}{2} sq.\ units$

B. $\frac{89}{2} sq.\ units$

C. $\frac{2}{\sqrt{79}} sq.\ units$

D. $\frac{79}{2} sq.\ units$

Answer: A

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18. Let the position vectors of the points A, B and C be $\vec{a}$, $\vec{b}$ and $\vec{c}$ respectively. Let Q be the point of intersection of the medians of the triangle ABC. Then $\overrightarrow{QA} + \overrightarrow{QB} + \overrightarrow{QC} =$

A. $\frac{\vec{a} + \vec{b} + \vec{c}}{2}$

B. $2\vec{a} + \vec{b} + \vec{c}$

C. $\vec{a} + \vec{b} + \vec{c}$

D. $\vec{0}$

Answer: D

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19. Find $\left[\vec{a}\ \vec{b}\ \vec{c}\right]$, where $\vec{a} = \hat{i},\ \vec{b} = \hat{j},\ \vec{c} = \hat{k}$.

A. 1

B. 4

C. 2

D. 3

Answer: A

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20. Express the vector $\vec{r} = 4\hat{i} + 13\hat{j} - 18\hat{k}$ as a linear combination of the vectors $\vec{a} = \hat{i} - 2\hat{j} + 3\hat{k}$ and $\vec{b} = 2\hat{i} + 3\hat{j} - 4\hat{k}$.

A. $\vec{r} = 2\vec{a} + 5\vec{b}$

B. $\vec{r} = 7\vec{a} - 3\vec{b}$

C. $\vec{r} = -3\vec{a} - 4\vec{b}$

D. $\vec{r} = -2\vec{a} + 3\vec{b}$

Answer: D

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21. $\left(\vec{a} \cdot \hat{i}\right)^2 + \left(\vec{a} \cdot \hat{j}\right)^2 + \left(\vec{a} \cdot \hat{k}\right)^2 =$

A. $\left|\vec{a}\right|^2$

B. $2\left|\vec{a}\right|^2$

C. $3\left|\vec{a}\right|^2$

D. $4\left|\vec{a}\right|^2$

Answer: A

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22. The position vector of a point R which divides the line joining P(6, 3, -2) and Q(3, 1, -4) in the ratio 2 : 1 externally is

A. $\hat{i} + 3\hat{j} - 2\hat{k}$

B. $3\hat{i} - \hat{k}$

C. $-\hat{j} - 6\hat{k}$

D. $2\hat{i} - \hat{j}$

Answer: C

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23. If vectors $\vec{a}, \vec{b}, \vec{c}$ are non-coplanar, then $\frac{\left[\vec{a} + 2\vec{b} \cdot \vec{b} + 2\vec{c} \cdot \vec{c} + 2\vec{a}\right]}{\left[\vec{a} \cdot \vec{b} \cdot \vec{c}\right]} =$

A. 3

B. 9

C. 8

D. 6

Answer: B

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24. If $\vec{a} = 3\hat{i} - 5\hat{j}$, $\vec{b} = 6\hat{i} + 3\hat{j}$ and $\vec{c} = \vec{a} \times \vec{b}$, then $|\vec{a}| : |\vec{b}| : |\vec{c}| =$

A. $\sqrt{34} : \sqrt{45} : \sqrt{39}$

B. $\sqrt{34} : \sqrt{45} : \sqrt{39}$

C. $34 : 39 : 45$

D. $39 : 35 : 34$

Answer: B

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25. Suppose $\vec{a} + \vec{b} + \vec{c} = 0, \left|\vec{a}\right| = 3, \left|\vec{b}\right| = 5, \left|\vec{c}\right| = 7,$ then the angle between $\vec{a}$ and $\vec{b}$ is

A. π

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

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

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

Answer: C

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26. $\frac{\vec{a}.\left(\vec{b} \times \vec{c}\right)}{\vec{b}.\left(\vec{c} \times \vec{a}\right)} + \frac{\vec{b}.\left(\vec{a} \times \vec{b}\right)}{\vec{a}.\left(\vec{b} \times \vec{c}\right)}$ is equal to

A. 1

B. 2

C. 0

D. ∞

Answer: A

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27. If three vectors $2\hat{i} - \hat{j} - \hat{k}, \hat{i} + 2\hat{j} - 3\hat{k}$ and $3\hat{i} + \lambda\hat{j} + 5\hat{k}$ are coplanar, then the value of λ is

A. -2

B. -3

C. -4

D. 2

Answer: C

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28. The volume of tetrahedron with vertices $-\hat{i}+\hat{k}, 2\hat{i}-\hat{j}, \hat{i}+2\hat{j}+5\hat{k}, \hat{i}+2\hat{j}+\hat{k}$ is

A. $3/16$

B. $16/3$

C. $15/2$

D. $2/15$

Answer: B

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29. If V is the volume of the parallelepiped having three coterminous edges, as $\vec{a}, \vec{b}$ and $\vec{c}$, then the volume of the parallelepiped having three coterminous edges as

$\alpha = \left(\vec{a} . \vec{a}\right)\vec{a} + \left(\vec{a} . \vec{b}\right)\vec{b} + \left(\vec{a} . \vec{c}\right)\vec{c}$

$\beta = \left(\vec{a} . \vec{b}\right)\vec{a} + \left(\vec{b} . \vec{b}\right)\vec{b} + \left(\vec{b} . \vec{c}\right)\vec{c}$

$\gamma = \left(\vec{a} . \vec{c}\right)\vec{a} + \left(\vec{b} . \vec{c}\right)\vec{b} + \left(\vec{c} . \vec{c}\right)\vec{c}$ is

A. V^3

B. 3V

C. V^2

D. 2V

Answer: A

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30. The points A, B and C with position vectors $3\hat{i} - y\hat{j} + 2\hat{k}, 5\hat{i} - \hat{j} + \hat{k}$ and $3x\hat{i} + 3\hat{j} - \hat{k}$ are collinear, then the values of x and y respectively are

A. 2, 3

B. 4, 5

C. 3, 3

D. $-1, 4$

Answer: C

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Wb Jee Workout Single Option Correct Type 2 Mark

1. Let $\vec{a} = 2\hat{i} - 3\hat{j} + 6\hat{k}$ and $\vec{b} = -2\hat{i} + 2\hat{j} - \hat{k}$, then $\frac{\text{Projection of } \vec{a} \text{ on } \vec{b}}{\text{Projection of } \vec{b} \text{ on } \vec{a}} =$

A. $\frac{3}{7}$

B. $\frac{7}{3}$

C. -4

D. 3

Answer: B

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2. The area of the parallelogram with $\vec{a}$ and $\vec{b}$ as adjacent sides is 20 sq. units. Then the area of the parallelogram having $7\vec{a} + 5\vec{b}$ and $8\vec{a} + 11\vec{b}$ as adjacent sides is

A. 2960 sq. units

B. 740 sq. units

C. 1340 sq. units

D. 3400 sq. units

Answer: B

View Text Solution

3. Let $\vec{a} = \hat{i} + 2\hat{j} + \hat{k}$, $\vec{b} = \hat{i} - \hat{j} + \hat{k}$ and $\vec{c} = \hat{i} - \hat{j} - \hat{k}$. A vector in the plane of $\vec{a}$ and $\vec{b}$ whose projection on $\vec{c}$ is $\frac{1}{\sqrt{3}}$, is

A. $4\hat{i} - \hat{j} + 4\hat{k}$

B. $3\hat{i} + \hat{j} - 3\hat{k}$

C. $2\hat{i} + \hat{j} - 2\hat{k}$

D. $4\hat{i} + \hat{j} - 4\hat{k}$

Answer: A

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4. If the volume of the parallelepiped formed by three non-coplanar vectors $\vec{a}, \vec{b}$ and $\vec{c}$ is 4 cubic units, then $\left[\vec{a} \times \vec{b} . \vec{b} \times \vec{c} . \vec{c} \times \vec{a}\right] =$

A. 8

B. 64

C. 16

D. 4

Answer: C

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5. $A. \left(\vec{B} + \vec{C}\right) \times \left(\vec{A} + \vec{B} + \vec{C}\right) =$

A. 0

B. $\left[\vec{A} . \vec{B} . \vec{C}\right] + \left[\vec{B} . \vec{C} . \vec{A}\right]$

C. $\left[\vec{A} . \vec{B} . \vec{C}\right]$

D. None of these

Answer: A

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6. If θ is the angle between the lines AB and AC where A, B and C are the three points with coordinates (1, 2, -1), (2, 0, 3), (3, -1, 2) respectively, then $\sqrt{462}\cos\theta$ is equal to

A. 20

B. 10

C. 30

D. 40

Answer: A

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7. If the position vectors of the vertices A, B and C of ΔABC are respectively $\overrightarrow{0}, -20\hat{i}+15\hat{j}$ and $36\hat{i}+15\hat{j}$, then find the position vector of the incentre of the triangle.

A. $\hat{i}+8\hat{j}$

B. $2\hat{i}+3\hat{j}$

C. $4\hat{i}+3\hat{j}$

D. $2\hat{i}-5\hat{j}$

Answer: A

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8. Let a, b, c be distinct non-negative numbers. If the vectors $a\hat{i}+a\hat{j}+c\hat{k}, \hat{i}+\hat{k}, c\hat{i}+c\hat{j}+b\hat{k}$ lie in a plane, then C is

A. A.M. of a, b

B. G.M. of a, b

C. H.M. of a, b

D. zero

Answer: B

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9. If $\vec{u}, \vec{v}, \vec{w}$ are the non-coplanar vectors, then $\left(\vec{u}+\vec{v}-\vec{w}\right).\left[\left(\vec{u}-\vec{v}\right)\times\left(\vec{v}-\vec{w}\right)\right]=$

A. $\vec{u}.\left(\vec{v}\times\vec{w}\right)$

B. $\vec{u}.\left(\vec{w}\times\vec{v}\right)$

C. $3\vec{u}.\left(\vec{v}\times\vec{w}\right)$

D. 0

Answer: A

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10. If $\hat{i}+2\hat{j}+3\hat{k}$ and $2\hat{i}-\hat{j}+4\hat{k}$ are the position vectors of the points A and B, then the position vector of the points of trisection of AB are

A. $\frac{4}{3}\hat{i}+\hat{j}+\frac{10}{3}\hat{k},\ \frac{5}{3}\hat{i}+\frac{11}{3}\hat{k}$

B. $-\frac{4}{3}\hat{i}-\hat{j}-\frac{10}{3}\hat{k},\ -\frac{5}{3}\hat{i}-\frac{11}{3}\hat{k}$

C. $\frac{4}{3}\hat{i}-\hat{j}-\frac{10}{3}\hat{k},\ \frac{-5}{3}\hat{i}+\frac{11}{3}\hat{k}$

D. $-\frac{4}{3}\hat{i}+\hat{j}-\frac{10}{3}\hat{k},\ \frac{5}{3}\hat{i}-\frac{11}{3}\hat{k}$

Answer: A

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11. If G is the centroid of the triangle PQR, where $\overrightarrow{GP} = 2\hat{i} + \hat{j} + 3\hat{k}, \overrightarrow{GQ} = \hat{i} - \hat{j} + 2\hat{k},$ then the area of the triangle PQR is

A. $\sqrt{35} sq.\ units$

B. $\frac{3\sqrt{35}}{2} sq.\ units$

C. $\frac{\sqrt{35}}{2} sq.\ units$

D. $\frac{5\sqrt{35}}{2} sq.\ units$

Answer: B

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12. The vectors $\vec{a}, \vec{b}, \vec{c}$ are such that the projection of $\vec{c}$ on $\vec{a}$ is equal to the projection of $\vec{c}$ on $\vec{b}$. If

$\left|\vec{a}\right| = 2,\ \vec{b}| = 1, |\vec{c}\ | = 3$ and $\vec{a}.\ \vec{b} = 1,$ then $\left|\vec{a} - 2\vec{b} - \vec{c}\right|$ is equal to

A. 3

B. $\sqrt{10}$

C. $\sqrt{12}$

D. $\sqrt{13}$

Answer: D

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13. Find the volume of the parallelepiped with segments AB, AC and AD as concurrent edges, where the position vectors of A, B, C, D are $\hat{i} + \hat{j} + \hat{k}, 2\hat{i} - \hat{j} + 3\hat{k}, 3\hat{i} - 2\hat{j} - 2\hat{k}$ and $3\hat{i} + 3\hat{j} + 4\hat{k}$ respectively.

A. 27 cu. units

B. 41 cu. units

C. 10 cu. units

D. 52 cu. units

Answer: B

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14. If $\vec{a}, \vec{b}, \vec{c}$ are unit coplanar vectors, then $\left[2\vec{a} - \vec{b}.2\vec{b} - \vec{c}.2\vec{c} - \vec{a}\right] =$

A. 0

B. 1

C. $-\sqrt{3}$

D. $\sqrt{3}$

Answer: A

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15. If $\vec{a}, \vec{b}, \vec{c}$ are position vectors of the vertices of the triangle ABC, then $\frac{\left|\left(\vec{a}-\vec{c}\right)\times\left(\vec{b}-\vec{a}\right)\right|}{\left(\vec{c}-\vec{a}\right).\left(\vec{b}-\vec{a}\right)}$ is equal to

A. cot A

B. cot C

C. $-\tan C$

D. tan A

Answer: D

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Wb Jee Workout One Or More Than One Option Correct Type 2 Mark

1. Let $\vec{a} = a_1\hat{i} + a_2\hat{j} + a_3\hat{k}$, $\vec{b} = b_1\hat{i} + b_2\hat{j} + b_3\hat{k}$ and $\vec{c} = c_1\hat{i} + c_2\hat{j} + c_3\hat{k}$ be three non-zero vectors such that $\vec{c}$ is a unit vector perpendicular to both $\vec{a}$ and $\vec{b}$. If the angle between $\vec{a}$ and $\vec{b}$ is $\frac{\pi}{6}$, then $\begin{vmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix}^2$ is equal to

A. 0

B. 1

C. $\frac{1}{4}\left(a_1^2 + a_2^2 + a_3^2\right)\left(b_1^2 + b_2^2 + b_3^2\right)$

D. $\frac{3}{4}\left(a_1^2 + a_2^2 + a_3^2\right)\left(b_1^2 + b_2^2 + b_3^2\right)\left(c_1^2 + c_2^2 + c_3^2\right)$

Answer: C

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2. The values of γ and μ for which the vectors $a = 2\hat{i} + \lambda\hat{j} - \hat{k}$ is perpendicular to the vector $\vec{b} = 3\hat{i} + \hat{j} + \mu\hat{k}$ with $\left|\vec{a}\right| = \left|\vec{b}\right|$ are

A. $\lambda = \frac{41}{12}, \mu = \frac{31}{12}$

B. $\lambda = \frac{41}{12}, \mu = -\frac{31}{12}$

C. $\lambda = -\frac{41}{12}, \mu = \frac{31}{12}$

D. None of these

Answer: C

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3. If $\vec{a} = \hat{i} + \hat{j} + \hat{k}, \vec{a}.\vec{b} = 1$ and $\vec{a} \times \vec{b} = \hat{j} - \hat{k}$, then $\vec{b}$ is

A. $\hat{i} - \hat{j} + \hat{k}$

B. $2\hat{j} - \hat{k}$

C. $\hat{i}$

D. $2\hat{i}$

Answer: C

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4. $\vec{a}$ is perpendicular to $\vec{b}+\vec{c}$, $\vec{b}$ is perpendicular to $\vec{c}+\vec{a}$ and $\vec{c}$ is perpendicular to $\vec{a}+\vec{b}$. If $\left|\vec{a}\right|=2, \left|\vec{b}\right|=3$ and $\left|\vec{c}\right|=6$, then $\left|\vec{a}+\vec{b}+\vec{c}\right|-2=$

A. 5

B. 8

C. 9

D. 10

Answer: A

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5. $\left[\vec{a}-\vec{b}.\vec{b}-\vec{c}.\vec{a}+\vec{c}\right]$ equals

A. $2\left[\vec{a}.\vec{b}.\vec{c}\right]$

B. $3\left[\vec{a}.\vec{b}.\vec{c}\right]$

C. $\left[\vec{a}.\vec{b}.\vec{c}\right]$

D. 0

Answer: A

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6. Let $\vec{a}=\begin{bmatrix}1\\0\\-3\end{bmatrix}, \vec{b}=\begin{bmatrix}2\\1\\0\end{bmatrix}, \vec{c}=\begin{bmatrix}1\\-1\\1\end{bmatrix}$. If the numbers α, β and γ are such that $\alpha\vec{a}+\beta\vec{b}+\gamma\vec{c}=\begin{bmatrix}-2\\-5\\6\end{bmatrix}$, then

A. $\alpha=-1$

B. $\beta=-2$

C. $\gamma = 3$

D. $\alpha + \beta + \gamma = 0$

Answer: A::B::C::D

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7. The value of a, for which the points A, B, C with position vectors $2\hat{i} - \hat{j} + \hat{k}, \hat{i} - 3\hat{j} - 5\hat{k}, a\hat{i} - 3\hat{j} + \hat{k}$ respectively are the vertices of a right angled triangle with $C = \frac{\pi}{2} are$

A. 1

B. 2

C. -1

D. -2

Answer: A::B

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8. The volume of the parallelepiped whose coterminous edges are represented by the vectors $8\vec{b} \times \vec{c}, 3\vec{c} \times \vec{a}$ and $4\vec{a} \times \vec{b}$, where

$$\vec{a} = (1 + \sin\theta)\hat{i} + \cos\theta\hat{j} + \sin 2\theta\hat{k},$$

$$\vec{b} = \sin\left(\theta + \frac{2\pi}{3}\right)\hat{i} + \cos\left(\theta + \frac{2\pi}{3}\right)\hat{j} + \sin\left(2\theta + \frac{4\pi}{3}\right)\hat{k},$$

$$\vec{c} = \sin\left(\theta - \frac{2\pi}{3}\right)\hat{i} + \cos\left(\theta - \frac{2\pi}{3}\right)\hat{j} + \sin\left(2\theta - \frac{4\pi}{3}\right)\hat{k}$$

is 18 cubic units, then the values of θ, in the interval $\left(0, \frac{\pi}{2}\right)$, is/are

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

B. $\frac{2\pi}{9}$

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

D. $\frac{4\pi}{9}$

Answer: A::B::D

View Text Solution

9. The number of distinct real values of λ, for which the vectors $-\lambda^2\hat{i}+\hat{j}+\hat{k}, \hat{i}-\lambda^2\hat{j}+\hat{k}$ and $\hat{i}+\hat{j}-\lambda^2\hat{k}$ are coplanar, is

A. zero

B. one

C. two

D. three

Answer: C

View Text Solution

10. Three vectors $\vec{a}, \vec{b}, \vec{c}$ are such that $\vec{a}\times\vec{b}=4\left(\vec{a}\times\vec{c}\right)$ and $\left|\vec{a}\right|=\left|\vec{b}\right|=1$ and $\left|\vec{c}\right|=\frac{1}{4}$. If the angle between $\vec{b}$ and $\vec{c}$ is $\frac{\pi}{3}$, then $\vec{b}$ is

A. $\vec{a}+4\vec{c}$

B. $\vec{a} - 4\vec{c}$

C. $4\vec{c} - \vec{a}$

D. $2\vec{c} - \vec{a}$

Answer: A::C

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11. Three vectors $\vec{a}, \vec{b}$ and $\vec{c}$ are of the same length and the angle between any two of them is the same. If $\vec{a} = \hat{i} + \hat{j}$ and $\vec{b} = \hat{j} + \hat{k}$, then $\vec{c}$ is

A. $-\frac{1}{3}\left(\hat{i} - 4\hat{j} + \hat{k}\right)$

B. $\hat{i} + \hat{k}$

C. $-\frac{1}{3}\left(-\hat{i} + 4\hat{j} + \hat{k}\right)$

D. $\frac{1}{7}\left(\hat{i} + 2\hat{j} + 3\hat{k}\right)$

Answer: A::B

View Text Solution

12. Let $\vec{a} = 2\hat{i} + \hat{j} + \hat{k}$, $\vec{b} = \hat{i} + 2\hat{j} - \hat{k}$ and a unit vector $\vec{c}$ be coplanar. If $\vec{c}$ is perpendicular to $\vec{a}$, then $\vec{c} =$

A. $\frac{-\hat{j} + \hat{k}}{\sqrt{2}}$

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

C. $\frac{\hat{i} - 2\hat{j}}{\sqrt{5}}$

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

Answer: A

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13. The vectors $(x, x+1, x+2), (x+3, x+4, x+5)$ and $(x+6, x+7, x+8)$ are coplanar for

A. all values of x

B. $x < 0$

C. $x > 0$

D. none of these

Answer: A::B::C

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14. If $\left|\vec{a}\right| = 3, \left|\vec{b}\right| = 4$ and $\left|\vec{c}\right| = 5,$ then

A. range of $\left|\vec{a} - \vec{b}\right|$ is $[1, 7]$

B. range of $\left|\vec{b} - \vec{c}\right|$ is $[1, 9]$

C. range of $\left|\vec{c}-\vec{a}\right|$ is $[2,8]$

D. none of these

Answer: A::B::C

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15. The volume of the parallelepiped whose edges are $\overrightarrow{OA}=2\hat{i}-3\hat{j}, \overrightarrow{OB}=\hat{i}+\hat{j}-\hat{k}, \overrightarrow{OC}=3\hat{i}-\hat{k}$ is

A. $\frac{4}{13} cu.\ units$

B. 4 cu. Units

C. $\frac{2}{7} cu.\ units$

D. none of these

Answer: B

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Wb Jee Previous Years Questions Single Option Correct Type 1 Mark

1. If the four points with position vectors $-2\hat{i}+\hat{j}+\hat{k}, \hat{i}+\hat{j}+\hat{k}, \hat{j}-\hat{k}$ and $\lambda\hat{j}+\hat{k}$ are coplanar, then $\lambda =$

A. 1

B. 2

C. -1

D. 0

Answer: A

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2. Which of the following is not always true?

A. $\left|\vec{a}+\vec{b}\right|^2=\left|\vec{a}\right|^2+\left|\vec{b}\right|^2$ if $\vec{a}$ and $\vec{b}$ are perpendicular to each other.

B. $\left|\vec{a}+\lambda\vec{b}\right|\geq\left|\vec{a}\right|$ for all $\lambda\in R$ if $\vec{a}$ and $\vec{b}$ are perpendicular to each other.

C. $\left|\vec{a}+\vec{b}\right|^2+\left|\vec{a}-\vec{b}\right|^2=2\left(\left|\vec{a}\right|^2+\left|\vec{b}\right|^2\right)$.

D. $\left|\vec{a}+\lambda\vec{b}\right|\geq\left|\vec{a}\right|$ for all $\lambda\in R$ if $\vec{a}$ is parallel to $\vec{b}$.

Answer: B

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3. For non-zero vectors $\vec{a}$ and $\vec{b}$ if $\left|\vec{a}+\vec{b}\right|<\left|\vec{a}-\vec{b}\right|$, then $\vec{a}$ and $\vec{b}$ are

A. collinear

B. perpendicular to each other

C. inclined at an acute angle

D. inclined at an obtuse angle

Answer: D

View Text Solution

4. For any vector $\vec{x}$, the value of $\left(\vec{x} \times \hat{i}\right)^2 + \left(\vec{x} \times \hat{j}\right)^2 + \left(\vec{x} \times \hat{k}\right)^2$ is equal to

A. $\left|\vec{x}\right|^2$

B. $2\left|\vec{x}\right|^2$

C. $3\left|\vec{x}\right|^2$

D. $4\left|\vec{x}\right|^2$

Answer: B

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5. If the sum of two unit vectors is a unit vector, then the magnitude of their difference is

A. $\sqrt{2}units$

B. 2 units

C. $\sqrt{3}units$

D. $\sqrt{5}units$

Answer: C

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6. Let $\vec{\alpha} = \hat{i} + \hat{j} + \hat{k}, \vec{\beta} = \hat{i} - \hat{j} - \hat{k}$ and $\vec{\gamma} = -\hat{i} + \hat{j} - \hat{k}$ be three vectors. A vector $\vec{\delta}$, in the plane of $\vec{\alpha}$ and $\vec{\beta}$, whose projection on $\vec{\gamma}$ is $\frac{1}{\sqrt{3}}$, is given by

A. $-\hat{i} - 3\hat{j} - 3\hat{k}$

B. $\hat{i} - 3\hat{j} - 3\hat{k}$

C. $-\hat{i} + 3\hat{j} + 3\hat{k}$

D. $\hat{i} + 3\hat{j} - 3\hat{k}$

Answer: C

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7. Let $\vec{\alpha}, \vec{\beta}, \vec{\gamma}$ be three unit vectors such that $\vec{\alpha} . \vec{\beta} = \vec{\alpha} . \vec{\gamma} = 0$ and the angle between $\vec{\beta}$ and $\vec{\gamma}$ is 30°. Then $\vec{\alpha}$ is

A. $2\left(\vec{\beta} \times \vec{\gamma}\right)$

B. $-2\left(\vec{\beta} \times \vec{\gamma}\right)$

C. $\pm 2\left(\vec{\beta} \times \vec{\gamma}\right)$

D. $\left(\vec{\beta} \times \vec{\gamma}\right)$

Answer: C

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8. Let $\hat{\alpha}, \hat{\beta}, \hat{\gamma}$ be three unit vectors such that $\hat{\alpha} \times \left(\hat{\beta} \times \hat{\gamma}\right) = \frac{1}{2}\left(\hat{\beta} + \hat{\gamma}\right)$ where $\hat{\alpha} \times \left(\hat{\beta} \times \hat{\gamma}\right) = (\hat{\alpha}.\hat{\gamma})\hat{\beta} - \left(\hat{\alpha}.\hat{\beta}\right)\hat{\gamma}.$ If $\hat{\beta}$ is not parallel to $\hat{\gamma}$, then the angle between $\hat{\alpha}$ and $\hat{\beta}$ is

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

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

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

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

Answer: D

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9. The position vectors of the points A, B, C and D are $3\hat{i} - 2\hat{j} - \hat{k}, 2\hat{i} - 3\hat{j} + 2\hat{k}, 5\hat{i} - \hat{j} + 2\hat{k}$ and $4\hat{i} - \hat{j} + \lambda\hat{k}$

respectively. If the points A, B, C and D lie on a plane, the value of λ is

A. 0

B. 1

C. 2

D. -4

Answer: D

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