RAMA STUDY CENTRE WHATSAPP-8754834604

XII - STANDARD - MATHEMATICS

CHAPTER - 6 [IMPORTANT QUESTIONS]

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1) By vector method, prove that
   i) $\cos(\alpha+\beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$
   ii) $\cos(\alpha-\beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$
   iii) $\sin(\alpha-\beta) = \sin\alpha\cos\beta - \cos\alpha\sin\beta$
   iv) $\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\cos\beta$
2) Prove by vector method that the perpendiculars (altitudes) from the vertices to the opposite sides of triangle are concurr
3) Find the magnitude and the direction cosines of the torque about the point (2,0,-1) of a force $2\hat{i}+\hat{j}-\hat{k}$, whose line of action passes through the origin
4) If $2\hat{i}-\hat{j}+3\hat{k}$, $3\hat{i}+2\hat{j}+\hat{k}$, $\hat{i}+m\hat{j}+4\hat{k}$ are coplanar, find m
5) If $\vec{a},\vec{b},\vec{c}$ are three vectors, prove that $[\vec{a}+\vec{c}, \vec{a}+\vec{b}, \vec{a}+\vec{b}+\vec{c}] = [\vec{a},\vec{b},\vec{c}]$
6) Find the volume of parallelopiped whose coterminus edges are represented by vectors $-6\hat{i}+14\hat{j}+10\hat{k}$, $14\hat{i}-10\hat{j}-6\hat{k}$ and $2\hat{i}+4\hat{j}-2\hat{k}$
7) Let $\vec{a},\vec{b},\vec{c}$ be three non zero vectors such that $\vec{c}$ is a unit vector normal to both $\vec{a}$ and $\vec{b}$. If the angle between $\vec{a}$ and $\vec{b}$ is $\pi/6$, show that $[\vec{a},\vec{b},\vec{c}]^2 = \frac{1}{4}|\vec{a}|^2|\vec{b}|^2$
8) Prove that $[\vec{a}\times\vec{b}, \vec{b}\times\vec{c}, \vec{c}\times\vec{a}] = [\vec{a}\,\vec{b}\,\vec{c}]^2$
9) Prove that $[\vec{a}-\vec{b}, \vec{b}-\vec{c}, \vec{c}-\vec{a}] = 0$
10) If $\vec{a},\vec{b},\vec{c}$ are three unit vectors such that $\vec{b}$ and $\vec{c}$ are non parallel and $\vec{a}\times(\vec{b}\times\vec{c}) = \frac{1}{2}\vec{b}$, find the angle between $\vec{a}$ and $\vec{c}$
11) Find the angle made by the straight line $\frac{x+3}{2} = \frac{y-1}{2} = -z$ with coordinate axes
12) Find the acute angle between the straight lines $\frac{x-4}{2} = \frac{y}{1} = \frac{z+1}{-2}$ and $\frac{x-1}{4} = \frac{y+1}{-4} = \frac{z-2}{2}$ and state whether they are parallel or perpendicular
13) Show that the lines $\frac{x-1}{4} = \frac{2-y}{6} = \frac{z-4}{12}$ and $\frac{x-3}{-2} = \frac{y-3}{3} = \frac{5-z}{6}$ are parallel
14) Find the acute angle between the following line $\vec{r} = (4\hat{i}-\hat{j})+t(\hat{i}+2\hat{j}-2\hat{k})$, $\vec{r} = (\hat{i}-2\hat{j}+4\hat{k})+s(-\hat{i}-2\hat{j}+2\hat{k})$

15) Determine whether the pair of straight lines $\vec{r} = (2\hat{i}+6\hat{j}+3\hat{k}) + t(2\hat{i}+3\hat{j}+4\hat{k})$, $\vec{r} = (2\hat{j}+3\hat{k}) + s(\hat{i}+2\hat{j}+3\hat{k})$ are parallel. Find the shortest distance between them

16) Show that the lines $\frac{x-3}{2} = \frac{y-3}{-1}$, $z-1=0$ and $\frac{x-6}{2} = \frac{z-1}{3}$, $y-2=0$ intersect. Also find the point of intersection

17) A variable plane moves in such a way that the sum of the reciprocals of its intercepts on the coordinate axes is a constant. Show that the plane passes through a fixed point

18) Find the vector and cartesian equation of plane passing through the point with position vector $2\hat{i}+6\hat{j}+3\hat{k}$ and normal to vector $\hat{i}+3\hat{j}+5\hat{k}$

19) If a plane meets the coordinate axes at A, B, C such that the centroid of the triangle ABC is the point (u,v,w) find the equation of the plane

20) Find the non-parametric form of vector equation and cartesian equation of the plane passing through the points (2,2,1), (9,3,6) and perpendicular to plane $2x+6y+6z=9$

21) If the straight lines $\frac{x-1}{1} = \frac{y-2}{2} = \frac{z-3}{m^2}$ and $\frac{x-3}{1} = \frac{y-2}{m^2} = \frac{z-1}{2}$ are coplanar, find the distinct real values of m

22) Find the angle between the straight lines $\vec{r} = (2\hat{i}+3\hat{j}+\hat{k}) + t(\hat{i}-\hat{j}+\hat{k})$ and the plane $2x-y+z=5$

23) Find the distance of a point (2,5,-3) from the plane $\vec{r}\cdot(6\hat{i}-3\hat{j}+2\hat{k}) = 5$

24) Find the distance between the parallel lines (planes) $x+2y-2z+1=0$ and $2x+4y-4z+5=0$

25) Find the angle between the lines $\vec{r} = (2\hat{i}-\hat{j}+\hat{k}) + t(\hat{i}+2\hat{j}-2\hat{k})$ and the plane $\vec{r}\cdot(6\hat{i}+3\hat{j}+2\hat{k}) = 8$

26) Find the length of the perpendicular from the point (1,-2,3) to the plane $x-y+z=5$.

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