One Two academy | Vector Algebra and 3D Geometry

Maximum Mark: 25 **Mathematics** **Time: 50 minutes**

Choose the correct answer: **3 x 1 = 3**

1. $\vec{r} = s\,\vec{\imath} + t\,\vec{\jmath}$ is the equation of

(a) a straight line joining the points $\vec{\imath}$ and $\vec{\jmath}$

(b) xoy plane (c) yoz plane (d) zox plane

2. Distance from origin to the plane $3x - 6y + 2z + 7 = 0$ is

(a) 0 (b) 1 (c) 2 (d) 3

3. The co-ordinate of the point where the line $\vec{r} = \left(6\,\hat{\imath} - \hat{\jmath} - 3\,\hat{k}\right) + t\left(-\hat{\imath} + 4\,\hat{k}\right)$ meets the plane $\vec{r}\,.\left(\hat{\imath} + \hat{\jmath} - \hat{k}\right) = 3$ are

(a) (2,1,0) (b) (7,-1,-7) (c) (1,2,-6) (d) (5,-1,1)

Answer the following: **3 x 2 = 6**

4. If $\vec{a}, \vec{b}, \vec{c}$ and $\vec{d}$ are co-planar vectors then show that $(\vec{a}\ x\ \vec{b})\ x\ (\vec{c}\ x\ \vec{d}) = 0$

5. Show that the points (2,3, 4),(1, 4,5) − and (8,1, 2) are collinear.

6. Find the angle between the planes $\vec{r}\,.\left(\hat{\imath} + \hat{\jmath} - 2\,\hat{k}\right) = 3$ and 2x – 2y + z = 2.

Answer any two of the following: **2 x 3 = 6**

7. With usual notations, prove by vector method $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$.

8. A plane passes through the point (-1,1,2) and the normal to the plane of magnitude $3\sqrt{3}$ makes equal acute angles with the co-ordinates axes. Find the equation of the plane.

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

Answer the following: **2 x 5 = 10**

10. Prove by vector method that the perpendiculars (altitudes) from the vertices to the opposite sides of a triangle are concurrent.

11. If the straight lines $\frac{x+1}{2} = \frac{y+1}{\lambda} = \frac{z}{2}$ and $\frac{x+1}{5} = \frac{y+1}{2} = \frac{z}{\lambda}$ are co-planar, find λ and equations of the planes containing these two lines.

OR

Find the non-parametric form of vector equation and Cartesian equation of the plane passing thought the point (1,-2,4) and perpendicular to the plane x+2y-3z = 11 and parallel to the lines $\frac{x+7}{3} = \frac{y+3}{-1} = \frac{z}{1}$.

All the Best

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Answer Key attached in the next page !!!

This page is to prevent seeing answer key

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Answer Key

Q.no	Solution	Marks
1.	(b) xoy plane	**1**
2.	(b) 1	**1**
3.	(d) (5,-1,1)	**1**
4.	Correct proof	**2**
5.	**Correct proof**	**2**
6.	$\boldsymbol{cos^{-1}\left(\frac{2}{3\sqrt{6}}\right)}$	**2**
7.	**Correct proof**	**3**
8.	$\vec{r}.\left(\hat{\imath}+\hat{\jmath}+\hat{k}\right)=2, x+y+z=2$	**3**
9.	(6,2,1)	
10.	**Correct proof**	**5**
11.	-2, 2, y+z+1= 0, y-z+1=0	**5**
	OR	
	x +10y + 7z – 9 = 0 and $\boldsymbol{\vec{r}.\left(\hat{\imath}+10\,\hat{\jmath}+7\,\hat{k}\right)=9}$	

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