N K MATHS ACADEMY

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UNIT TEST-2022-23

MATHEMATICS

UNIT TEST -7

MARKS: 40 **TIME: 1.00 HR**

I. CHOOSE THE BEST ANSWER: 8X1=8

1. The angle between the lines $\frac{x-2}{3}=\frac{y+1}{-2}, z=2$ and $\frac{x-1}{1}=\frac{2y+3}{3}, \frac{z+5}{2}$ is

(1) $\frac{\pi}{6}$ (2) $\frac{\pi}{4}$ (3) $\frac{\pi}{3}$ (4) $\frac{\pi}{2}$

2. The angle between the line $\vec{r}=\left(\hat{i}+2j-3k\right)+t\left(2\hat{i}+j-2k\right)$ meets the plane $\vec{r}.\left(\hat{i}+j\right)+4=0$ is

(1) 0° (2) 30° (3) 45° (4) 90°

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

(1) 0 (2)1 (3)2 (4)3

4. If the direction cosines of a line are $\frac{1}{c}$, $\frac{1}{c}, \frac{1}{c}$ then

(1) $c=\pm 3$ (2) $c=\pm\sqrt{3}$ (3) $c>0$ (4) $0<c<1$

5. If the distance of the point (1,1,1)from the origin is half its distance from the plane $x+y+z+k=0$, then the value of k are

(1) ±3 (2) ±6 (3)-3,9 (4)3,-9

6. If the length of the perpendicular from the origin to the plane $2x+3\lambda+\lambda z=1, \lambda>0$ is $\frac{1}{5}$, then the value of λ is

(1) $2\sqrt{3}$ (2) $3\sqrt{2}$ (3)0 (4)1

7. The point of intersection of the line $\vec{r}=\left(\vec{i}-\vec{k}\right)+t\left(3\vec{i}+2\vec{j}+7\vec{k}\right)$ and the plane $\vec{r}\cdot(\vec{i}+\vec{j}-\vec{k})=8$ is

(1) (8, 6, 22) (2) (-8, - 6, -22) (3) (4, 3, 11) (4) (-4, -3, -11)

8. The angle between the line $\bar{r}=\bar{a}+t\,\bar{b}$ and the plane $\bar{r}\cdot\bar{n}=q$ is connected by the relation.

(1) $\cos\theta=\frac{\vec{a}\cdot\vec{n}}{q}$ (2) $\cos\theta=\frac{\vec{b}\cdot\vec{n}}{\left|\vec{b}\right|\left|\vec{n}\right|}$ (3) $\sin\theta=\frac{\vec{a}\cdot\vec{b}}{\left|\vec{n}\right|}$ (4) $\sin\theta=\frac{\vec{b}\cdot\vec{n}}{\left|\vec{b}\right|\left|\vec{n}\right|}$

II. ANSWER ANY 4 QUESTIONS: 4X2=8

9. 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.

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

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

12. Find the distance between the planes $\vec{r}.\left(2\hat{i}-\hat{j}-2\hat{k}\right)=6$ and $\vec{r}.\left(6\hat{i}-3\hat{j}-6\hat{k}\right)=27$.

13. Find the intercepts cut off by the plane $\vec{r}.\left(6\hat{i}+4\hat{j}-3\hat{k}\right)=12$

III. ANSWER ANY 3 QUESTIONS: 3X3=9

14. Find the vector equation in parametric form and Cartesian equation of the line passing through $(-4,2,-3)$ and is parallel to the line $\frac{-x-2}{4}=\frac{y+3}{-2}=\frac{2z-6}{3}$.

15. If the straight line joining the points $(2,1,4)$ and $(a-1,4,-1)$ is parallel to the line joining the points $(0,2,b-1)$ and $(5,3,-2)$ Find the value of and b.

16. Find the direction cosines of the normal to the plane and length of the perpendicular form the origin to the plane $\vec{r}.\left(3\hat{i}-4j+12k\right)=5$.

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

18. Find the coordinate of the point where the straight line $\vec{r}.\left(2\hat{i}-j+2k\right)+t\left(3\hat{i}-4j+2k\right)$ intersects the plane $x-y+z-5=0$.

IV. ANSWER ANY3 QUESTIONS: 3X5=15

19. Find the shortest distance between the two given straight line $\vec{r}=\left(2\hat{i}+3j+4k\right)+t\left(-2\hat{i}+j-2k\right)$ and $\frac{x-3}{2}=\frac{y}{-1}=\frac{z+2}{2}$.

20. 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.

21. Find the non-parametric form of vector equation, and Cartesian equation of the plane passing through the point (2, 3, 6) and parallel to the straight lines $\frac{x-1}{2}=\frac{y+1}{3}=\frac{z-3}{1}$ and $\frac{x+3}{2}=\frac{y-3}{-5}=\frac{z+1}{-3}$.

22. Find the parametric vector, non-parametric vector and Cartesian form of the equations of the plane passing through the points $(3,6,-2),(-1,-2,6)$ and $(6,-4,-2)$.

23. Show that the lines $\frac{x-2}{1}=\frac{y-3}{1}=\frac{z-4}{3}$ and $\frac{x-1}{-3}=\frac{y-4}{2}=\frac{z-5}{1}$ are coplanar. Also, find the plane contain these lines.