N K MATHS ACADEMY

TIRUPUR-9843434491

UNIT TEST 2021-22

MATHEMATICS

VOLUME I (5 MARKS)

Marks: 50 **Time 1.30 hrs**

ANSWER ANY 10 QUESTIONS: **10X5=50**

1. The prices of three commodities *A*, *B*, and *C* are Rs *x*, *y*, and *z* per units respectively. A person *P* purchases 4 units of *B* and sells two units of *A* and 5 units of *C*. Person *Q* purchases 2 units of *C* and sells 3 units of *A* and one unit of *B* . Person *R* purchases one unit of *A* and sells 3 unit of *B* and one unit of *C*. In the process *P*, *Q*, and *R* earn Rs 15,000, Rs 1,000 and Rs 4,000 respectively. Find the prices per unit of *A*, *B*, and *C* . (Use matrix inversion method to solve the problem.)

2. If ax^2+bx+c is divided by $x+3, x-5$ and $x-1$, the remainders are 21, 61 and 9 respectively .Find a, b and c. (Use Gaussian elimination method)

3. Let z_1, z_2 and z_3 be complex number such that $|z_1|=|z_2|=|z_3|=r>0$ and $z_1+z_2+z_3\neq 0$. Prove that $\left|\dfrac{z_1z_2+z_2z_3+z_3z_1}{z_1+z_2+z_3}\right|$.

4. If $z=x+iy$ is a complex number such that $\operatorname{Im}\left(\dfrac{2z+1}{iz+1}\right)=0$, show that locus of z is $2x^2+2y^2+x-2y=0$.

5. If $2+i$ and $3-\sqrt{2}$ are roots of the equation $x^6-13x^5+62x^4-126x^3+65x^2+127x-140=0$, find all roots.

6. Find the domain of $f(x)=\sin^{-1}\left(\dfrac{x^2+1}{2x}\right)$.

7. Show that the line $x-y+4=0$ is a tangent to the ellipse $x^2+3y^2=12$. Also find the coordinates of the point of contact.

8. A rod of length 1.2m moves with its end always touching the coordinates axis. The locus of a point P on the rod,which is 0.3m from the end in contact with x-axis in an ellipse find the eccentricity.

9. Assume that water issuing from the end of a horizontal pipe, 7.5m above the ground, describes a parabolic path. The vertex of the parabolic path is at the end of the pipe. At a position 2.5m below the line of the pipe,the flow of wate has curved outwards 3m beyond this vertical line will the water strike the ground

10. Identify the type of conic and find center, foci, vertices and directrix of $18x^2+12y^2-144x+48y+120=0$.

11. Find the parametric form of vector equation, and Cartesian equations of the plane containing the line $\vec{r}=\left(\hat{i}-\hat{j}+3\hat{k}\right)+\left(2\hat{i}-\hat{j}+4\hat{k}\right)$ and perpendicular to the plane $\vec{r}.\left(\hat{i}+2\hat{j}+\hat{k}\right)=8$.

12. Find parametric form of vector equation and Cartesian equations of the plane passing through the points $(2,2,1),(1,-2,3)$ and parallel to the straight line passing through the points $(2,1,-3)$ and $(-1,5,-8)$.

13. Using vector method, prove that $\cos(\alpha-\beta)=\cos\alpha\cos\beta+\sin\alpha\sin\beta$.

14. Prove that vector method that the perpendicular (attitudes) from the vertices to the opposite sides of a triangle is concurrent.

ALL THE BEST

CONTACT FOR HOME TUITIONS / ONLINE CLASSES

(9, 10, 11, 12 MATRIC /CBSE/ISC/ICSE)

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