N K MATHS ACADEMY

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UNIT TEST-2022-23

MATHEMATICS

UNIT TEST -3

MARKS: 40   **TIME: 1.00 HR**

I. CHOOSE THE BEST ANSWER: 8X1=8

1. If f and g are polynomials of degrees m and n respectively, and if $h(x) = (f \circ g)(x)$, then the degree of h is

   (1) mn (2) $m+n$ (3) m^n (4) n^m

2. If α, β and γ are the roots of $x^3 + px^2 + qx + r$, then $\sum \dfrac{1}{\alpha}$ is

   (1) $-\dfrac{q}{r}$ (2) $-\dfrac{p}{r}$ (3) $\dfrac{q}{r}$ (4) $-\dfrac{q}{p}$

3. The polynomial $x^3 - kx^3 + 9x$ has three real roots if and only if, k Satisfies

   (1) $|k| \leq 6$ (2) k=0   (3) $|k| \succ 6$ (4) $|k| \geq 6$

4. The number of real number in $[0, 2\pi]$ satisfying $\sin^4 x - 2\sin^2 x + 1$ is

   (1) 2   (2) 4   (3) 1   (4) ∞

5. If $x^3 + 12x^3 + 10ax + 1999$ definitely has a positive root, if and only if

   (1) $a \geq 0$ (2) $a \succ 0$ (3) $a < 0$ (4) $a \leq 0$

6. The number of positive roots of the polynomial $\displaystyle\sum_{j=0}^{n} {}^{n}C_r(-1)^r x^r$ is

   (1) 0   (2) n   (3) <n   (4) r

7. If $-i + 2$ is one is one root equation $ax^2 - bx + c = 0$, then the other root is

   (1) $-i - 2$ (2) $i - 2$ (3) $2 + i$ (4) $2i + 1$

8. If $\dfrac{1-i}{1+i}$ is a root of $ax^2 + bx + 1 = 0$, where a, b are real then (a,b) is

   (1) (1,1)   (2) (1,-1)   (3) (0,1)   (4) (1,0)

II. ANSWER ANY 4 QUESTIONS: 4X2=8

9. Construct a cubic equation with roots 1, 1, and -2

10. Find a polynomial equation of minimum degree with rational coefficients, having $2i + 3$ as a root.

11. If $x^2 + 2(k+2)x + 9k = 0$ has equal roots, find k.

12. Solve the equation $x^4 - 9x^2 + 20 = 0$

13. Find the sum of squares of roots of the equation $2x^4 - 8x^3 + 6x^2 - 3 = 0$.

III. ANSWER ANY 3 QUESTIONS: 3X3=9

14. If p and q are the roots of the equation $lx^2 + nx + n = 0$, show that $\sqrt{\dfrac{p}{q}} + \sqrt{\dfrac{q}{p}} + \sqrt{\dfrac{n}{l}} = 0$

15. Form a polynomial equation with integer coefficients with $\sqrt{\dfrac{\sqrt{2}}{\sqrt{3}}}$ as a root.

16. Solve the cubic equation: $2x^3 - x^2 - 18x + 9 = 0$ if sum of two of its roots vanishes.

17. Solve the equation $3x^3 - 16x^2 + 23x - 6 = 0$ if the product of two roots is 1.

IV. ANSWER ANY 3 QUESTIONS: 3X5=15

18. Find a polynomial equation of minimum degree with rational coefficients, having $\sqrt{5} - \sqrt{3}$ as a root.

19. 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.

20. Solve the equation $(x - 2)(x - 7)(x - 3)(x + 2) + 19 = 0$

21. Solve the equations $6x^4 - 35x^3 + 62x^2 - 35x + 6 = 0$