



Mahila Vikas Sanstha's

**INDRAPRASTHA NEW ARTS
COMMERCE & SCIENCE
COLLEGE,** AT POST NALWADI, DIST. WARDHA (M.S.)

Accredited 'B' by NAAC

Approved by government
of Maharashtra

Affiliated to Rashtrasant Tukadoji
Maharaj Nagpur University, Nagpur

Recognised by U.G.C New Delhi
under section 2 (f) & 12 (b) of
UGC act 1956

SUBJECT: ELEMENTRY MATHEMATICS

1. Find real number x and y such that:

$$2x-3iy+4ix-2y-5-10i = (x+y+2) - (y-x+3)i$$

2. Prove:

a) $|Z_1+Z_2| \leq |Z_1| + |Z_2|$

b) $\arg z + \arg \bar{z} = 0$

3. Express each of the following complex number in polar form :

$$2+i$$

4. Prove DMT if n is positive or negative fraction then $(\cos \theta + i \sin \theta)^n$ is one of the value of $(\cos \theta + i \sin \theta)^n$, where $\theta \in \mathbb{R}$.

5. Prove the following :

$$(\sqrt{3}+i)^n + (\sqrt{3}-i)^n = 2^{n+1} \cos\left(\frac{n\pi}{6}\right).$$

6. Find the value of $(32)^{1/5}$.

7. Find, all the (a) fourth root (b) seventh root of unity.

8. Prove that if $\sinh w = z$, then $w = \sinh^{-1} z = \log(z + \sqrt{z^2 + 1})$

9. If $\cosh(\alpha + i\beta) = \sin(x + iy)$

10. prove that :

$$|e^z| = e^x$$

11. prove that there cannot be any finite values of z such that

$$e^z = 0.$$

12. Define, unit matrix, square matrix, diagonal matrix, skew symmetry matrix, with suitable example.



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13. what is echelon matrix

14. Find the rank of the following matrices:

$$(i) \begin{pmatrix} 2 & 1 & -1 \\ 0 & 3 & -2 \\ 2 & 4 & -3 \end{pmatrix}$$

15. show that $\text{rank}(AA') = \text{rank } A$.

16. show that the rank of a skew symmetry matrix cannot be 1.

17. solve the system of equation :

$$5x + 3y + 7z = 4, 3x + 26y + 2z = 9, 7x + 2y + 11z = 5$$

18. show that the equation :

$$X + 2y - z = 3, 3x - y + 2z = 1, 2x - 2y + 3z = 2, x - y + z = -1.$$

19. Find the eigen value and associated eigen vector for the following matrices :

$$\begin{pmatrix} 1 & -2 \\ -5 & 4 \end{pmatrix}$$

20. solve the equation $4x^2 + 20x^2 - 23x + 6 = 0$, two of its roots being equal.

21. solve the equation $8x^4 - 2x^2 - 27x^2 + 6x + 9 = 0$, two of its roots being equal but opposite in sign.

22. solve the equation $2x^2 - x^2 - 22x - 24 = 0$, two of the roots being in the ratio 3:4.

23. Find the condition that the roots of the equation $x^3 - px^2 + qx - r = 0$ may be in A.P and hence solve $x^3 - 12x^2 - 39x - 28 = 0$.

24. in an equation with rational coefficients, surd roots occur in pairs.

25. From the equation the equation of lowest dimension with rational coefficient, one of whose roots is $\sqrt{3} + i\sqrt{2}$.



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26. form the equation whose root are 0,0,2,2,-3,-3

28. solve the equation $x^4 - 2x^2 + 8x - 3 = 0$.

29. The product of any m consecutive integers is divisible by $m!$.

30. show that if a is an integer, then 3 divides $a^3 - a$.

31. let a and b be integer, not both zero. then a and b are relatively prime if and only if there exist integers x and y such that $1 = xa + yb$.

32. if $k \neq 0$, then $\gcd(ka, kb) = k \gcd(a, b)$.

34. prove that the integer $53^{103} + 103^{53}$ is divisible by 39.

35. Give an example to show that $a^2 \equiv b^2 \pmod{n}$ need not imply that $a \equiv b \pmod{n}$.

36. prove Chinese remainder theorem.

37. find the integer having the remainders 1, 2, 5, 5 when divided by 2, 3, 6, 12 respectively.

38. prove Euler's formula.

39. find the value of $(32)^{1/5}$.

40. prove that $\tan(iz) = i \tanh z$.