

Basic Mathematics

Time - Three Hours

210199150004

Max Marks - 35

Section - A

Note - Attempt all questions. Each question carries 1 mark.

Fill in the blanks.

1. $(i)^{15} = \dots\dots\dots$
2. ${}^7P_4 = \dots\dots\dots$
3. ${}^{11}C_9 = \dots\dots\dots$
4. $\sin 105^\circ = \dots\dots\dots$
5. $\frac{d}{dx}(100) = \dots\dots\dots$

Write True/False

6. $\frac{d}{dx} e^x = e^x$
7. $\int 5dx = 0$.
8. A square matrix is invertible iff it is non- singular.
9. A matrix which is both symmetrical as well as skew symmetric is a null matrix.
10. The $\sin \frac{\pi}{4} = 1$.

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Section - B

Note: Attempt any five questions. Each question carries 2 marks.

11. Find 10th term in the expansion $(2x + \frac{1}{x})^{12}$.
12. Express $\frac{1}{3-4i}$ in the form $A + iB$.
13. If $A = \begin{bmatrix} 5 & -1 \\ 6 & 7 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix}$, Verify $(A+B)^T = A^T + B^T$.
14. Find X and Y if $X + Y = \begin{bmatrix} 7 & 0 \\ 2 & 5 \end{bmatrix}$ and $X - Y = \begin{bmatrix} 3 & 0 \\ 0 & 3 \end{bmatrix}$.
15. Write Minors of each element of matrix $\begin{bmatrix} 7 & -4 \\ 2 & 3 \end{bmatrix}$.
16. Find $\frac{dy}{dx}$ for $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$.
17. Solve $\int \frac{1}{5-9x^2} dx$.

Section - C

Note: Attempt any three questions. Each question carries 5 marks.

18. Find the term independent of x in the expansion of $(2x - \frac{1}{x})^{10}$.
19. Express $\log(1+i)$ in the form $A + iB$.
20. Solve the matrix $\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix}$.
21. Find the minors and cofactors of the elements of $A = \begin{bmatrix} 7 & 2 & -2 \\ 5 & -5 & 6 \\ -3 & 4 & 2 \end{bmatrix}$.
22. If ${}^nC_{15} = {}^nC_8$, find ${}^nC_{21}$.