



Unit - I

2. a) Prove that $\log \frac{81}{8} - 2 \log \frac{3}{2} + 3 \log \frac{2}{3} + \log \frac{3}{4} = 0$.
- b) Find the 5th term in the expansion of $\left(\frac{3x}{4} + \frac{4}{3x}\right)^{12}$.
- c) Prove that the quadrilateral with vertices (6, 6), (2, 3) and (4, 7) are the vertices of a right angled triangle. **(4+4+4)**
3. a) Solve for x, if $\log_x 3 + \log_x 9 + \log_x 729 = 9$.
- b) Find the area of the triangle represented by (2, 3), (5, 7) and (-3, 4).
- c) Find the equation of straight line passing through the point (-3, 1) perpendicular to the line $5x - 2y + 7 = 0$. **(4+4+4)**

Unit - II

4. a) If $\cos \theta = \frac{24}{25}$ and θ is an acute angle, find the values of $\sin \theta$, $\operatorname{cosec} \theta$, $\tan \theta$ and $\cot \theta$.
- b) Evaluate $\lim_{x \rightarrow 3} \frac{x^2 + 2x - 5}{x^2 - 9}$.
- c) Differentiate $9x^4 - 7x^3 + 8x^2 - \frac{8}{x} + \frac{10}{x^3}$ with respect to x. **(4+4+4)**
5. a) If $\sin \theta = \frac{8}{17}$, find $\tan \theta + \sec \theta$.
- b) Discuss the continuity of the function $f(x) = \frac{x^2 - 4}{x - 2}$ when $0 \leq x \leq 2$, $f(x) = 2$, for $x \geq 2$, discuss the continuity at $x = 2$. **(4+4+4)**
- c) Evaluate $\int (4x^3 + 3x^2 - 2x + 5) dx$.



Unit – III

6. a) If $A = \begin{bmatrix} 1 & 1 & -1 \\ 2 & -3 & 4 \\ 3 & -2 & 3 \end{bmatrix}$, $B = \begin{bmatrix} -1 & -2 & -1 \\ 6 & 12 & 6 \\ 5 & 10 & 5 \end{bmatrix}$ and $C = \begin{bmatrix} -1 & -1 & 1 \\ 2 & 2 & -2 \\ -3 & -3 & 3 \end{bmatrix}$, show that A.B and C.A are null matrices.

b) If $A = \begin{bmatrix} 2 & -3 & 1 \\ 4 & 2 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 3 & -2 & 4 \\ 1 & 3 & -5 \end{bmatrix}$, show that $(A+B)' = A' + B'$. (6+6)

7. a) If $A = \begin{bmatrix} 1 & 2 & 1 \\ 0 & 1 & -1 \\ 3 & -1 & 1 \end{bmatrix}$, show that $A^3 - 3A^2 - A + 9I = 0$.

b) If $A = \begin{bmatrix} 1 & 4 & 5 \\ 3 & 2 & 6 \\ 0 & 1 & -3 \end{bmatrix}$, find the Adjoint of A. (6+6)

Unit – IV

8. a) Find the inverse of $\begin{bmatrix} 1 & 0 & -4 \\ -2 & 2 & 5 \\ 3 & -1 & 2 \end{bmatrix}$.

b) Using matrices, solve the following equations :

$$x + y + 2z = 4$$

$$2x - y + 3z = 9$$

$$3x - y - z = 2$$

(6+6)

9. a) Show that the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 2 & 3 \\ 0 & 0 & 2 \end{bmatrix}$ satisfies its characteristic equation.

b) Find the three numbers in A.P. whose sum is 24 and whose product is 440. (6+6)