SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai — 600 044.
B.Sc.(DS) - END SEMESTER EXAMINATIONS APRIL-2023
SEMESTER - I
22UDSAT1001 - Allied Mathematics I

Total Duration : 2 Hrs 30 Mins.   Total Marks : 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. Find the Sum of the series $1 + \dfrac{1}{3} + \dfrac{1.3}{3.6} + \dfrac{1.3.5}{3.6.9} + \ldots\ldots$

2. If $y = x - \dfrac{x^2}{2} + \dfrac{x^3}{3} - \dfrac{x^4}{4} + \ldots\ldots$ show that $x = y + \dfrac{y^2}{2} + \dfrac{y^3}{3} + \dfrac{y^4}{4} + \ldots..$

3. If A $= \begin{pmatrix} cos\theta & sin\theta \\ -sin\theta & cos\theta \end{pmatrix}$, then show that A is orthogonal.

4. Find the Eigen value of the matrix $\begin{pmatrix} 0 & 1 & 1 \\ -4 & 4 & 2 \\ 4 & -3 & -1 \end{pmatrix}$

5. Solve $x^4 - 2x^3 - 5x^2 + 6x + 2 = 0$ given that 1+ i is a root

6. Diminish the roots of the following equation by
   $2x^4 - 5x^3 + 7x^2 - 4x + 5 = 0$

7. Show that $2^5 cos^6\theta = cos6\theta + 6cos4\theta + 15cos2\theta + 10$

8. If $y = \dfrac{logx}{x^2}$ Show that $x^3y_3 + 6x^2y_2 + 4xy_1 - 4y = 0$

Section C

Answer any **THREE** questions $(3 \times 10 = 30$ Marks)

9. Apply Newton's backward difference formula to find a polynomial of degree 3, Using the table given below

x	3	4	5	6
y	6	24	60	120

10. Obtain the characteristics equation of $A = \begin{pmatrix} 1 & -1 & 2 \\ -2 & 1 & 3 \\ 3 & 2 & -3 \end{pmatrix}$ and use it

    calculate A^{-1}

11. Solve $x^5 - 5x^4 + 9x^3 + 5x - 1 = 0$

12. If $sin(A + iB) = x + iy$ then
    (i) S.T $x = sinAcoshB$
    (ii) S.T $\dfrac{x^2}{sin^2A} - \dfrac{y^2}{cos^2A} = 1$
    (iii) S.T $\dfrac{x^2}{cosh^2B} - \dfrac{y^2}{sinh^2B} = 1$

13. If $x = rsin\theta cos\phi$, $y = rsin\theta sin\phi$, $z = rcos\theta$,Find the jacobian of x, y, z
    w.r.to r, θ, ϕ

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