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. END SEMESTER EXAMINATIONS NOVEMBER-2022
SEMESTER - I
20UCHAT1001 - Allied Mathematics-I

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

Section A

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

1. Show that $\log_3 e$ - $\log_9 e$ +$\log_{27} e$ - ... $= \dfrac{\log e^2}{\log e^3}$.
2. Find the eigen values and eigen vectors of the matrix $\begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix}$.
3. Show that $\cos 6\theta = 32\cos^6\theta$ - $48\cos^4\theta + 18\cos^2\theta$ - 1.
4. Prove that $\sinh^{-1}x = \log(x + \sqrt{x^2+1})$.
5. Given the following values for x and y

x	0	1	2	3	4	5
y	3	12	81	200	100	8

   Find $\Delta^5 y_0$.
6. If A $= \begin{pmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{pmatrix}$, then show that A is orthogonal.
7. Express $\dfrac{\sin 5\theta}{\sin\theta}$ as a polynomial in $\cos\theta$.
8. Find the missing term in the following table

x	1	2	3	4	5	6	7
y	2	4	8	-	32	64	128

Section B

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

9. Find sum of the series $1 + \dfrac{1}{3} + \dfrac{1.3}{3.6} + \dfrac{1.3.5}{3.6.9} + ...$
10. Verify Cayley-Hamilton theorem for the matrix A $= \begin{pmatrix} 1 & -1 & 2 \\ -2 & 1 & 3 \\ 3 & 2 & -3 \end{pmatrix}$.

Contd...

11. Show that $\cos 8\theta = 128\cos^8\theta$ - $256\cos^6\theta + 160\cos^4\theta$ - $32\cos^2\theta + 1$.

12. If $\sin(A + iB) = x + iy$, then show that
$$\frac{x^2}{\sin^2 A} - \frac{y^2}{\cos^2 A} = 1 \text{ and } \frac{x^2}{\cosh^2 B} + \frac{y^2}{\sinh^2 B} = 1.$$

13. Use Newton's formula to find y when $x = 142$, given that

x	140	150	160	170	180
y	3.685	4.854	6.302	8.076	10.225

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