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.(Physics) END SEMESTER EXAMINATIONS NOVEMBER -2023
SEMESTER - III
20UPHAT3003 - 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 to infinity of the series $1 + \frac{1+2}{\lfloor 2} + \frac{1+2+2^2}{\lfloor 3} + ...\infty$
2. Find the eigen values and eigen vector of the matrix $\begin{pmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{pmatrix}$
3. Expand cos 6θ in terms of sin θ
4. Apply Newton's Backward formula to find a polynomial of degree 3, which includes the following x,y pairs

x	3	4	5	6
y	6	24	60	120

5. Prove that $\sinh^{-1}x = \log_e(x + \sqrt{x^2+1})$
6. Represent the matrix $\begin{pmatrix} 3 & -1 & 6 \\ 4 & 2 & -3 \\ 1 & 3 & -6 \end{pmatrix}$
   As the sum of a symmetric and a skew symmetric matrices.
7. If $\frac{sinx}{x} = \frac{863}{864}$ Find an approximate the value of x.
8. Sum to infinity of the series $1 + \frac{3}{4} + \frac{3.5}{4.8} + \frac{3.5.7}{4.8.12} + ...\infty$

Section C

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

9. Find the Sum to infinity series $\frac{1}{6} + \frac{1.4}{6.12} + \frac{1.4.7}{6.12.18} + ...\infty$
10. Verify cayley Hamilton theorem and find inverse of the given matrix $\begin{pmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{pmatrix}$

Contd...

11. Expand $\sin^3\theta\cos^5\theta$ in a series of sines of multiples of θ.

12. Use Lagrange interpolation formula fit a polynomial to the data

x	0	1	3	4
y	-12	0	6	12

13. If $\tan(x+iy) = u+iv$, prove that $\frac{u}{v} = \frac{sin2x}{sin2y}$

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