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 - NOV'2024
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 of the series $1 + \frac{1}{3} + \frac{1.3}{3.6} + \frac{1.3.5}{3.6.9} + ...$
2. If $A = \begin{pmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{pmatrix}$ then show that A is orthogonal.
3. Find the eigen values of the matrix $\begin{pmatrix} 0 & 1 & 1 \\ -4 & 4 & 2 \\ 4 & -3 & -1 \end{pmatrix}$
4. Show that -$2^5 \sin^6\theta = \cos 6\theta$ - $6\cos 4\theta + 15\cos 2\theta$ - 10.
5. Express $\cos 6\theta$ as a polynomial in $\cos\theta$.
6. Find the value of y when x = 8 by using Newton forward formula

X	0	5	10	15
y	7	11	14	18

7. If $\tan(\theta + i\phi) = x + iy$, then show that $x^2 + y^2 + 2x\cot 2\theta = 1$.
8. Prove that $\frac{1 + \tan hx}{1 - \tan hx} = \cos h2x + \sin h2x$.

Section C

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

9. Show that $\frac{1}{1.2} + \frac{1}{3.4} + \frac{1}{5.6} + ... = log2$
10. Verify Cayley-Hamilton theorem for the matrix $A = \begin{pmatrix} 1 & -1 & 2 \\ -2 & 1 & 3 \\ 3 & 2 & -3 \end{pmatrix}$
11. Express $\frac{\sin 9\theta}{\sin\theta}$ in terms of $\sin\theta$.

Contd...

12. Use Lagrange's formula to find y when x $= 2$ given

X	0	3	5	6	8
y	276	460	414	343	110

13. If $\sin(A + iB) = x + iy$, then show that $\dfrac{x^2}{\sin^2 A} - \dfrac{y^2}{\cos^2 A} = 1$.

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