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 APRIL-2022
SEMESTER - I
16UCHAT1MA1 & UCH/AT/1MA1 - Allied Mathematics - I

Total Duration : 3 Hrs.   **Total Marks : 60**

Section A

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

1. Prove that $\dfrac{e-1}{e+1} = \dfrac{\frac{1}{2!} + \frac{1}{4!} + \frac{1}{6!} + ...\infty}{\frac{1}{1!} + \frac{1}{3!} + \frac{1}{5!} + ...\infty}$.

2. Prove that $\log \dfrac{n+1}{n-2} = \dfrac{2_n}{n^2+1} + \dfrac{1}{3}\left(\dfrac{2_n}{n^2+1}\right)^3 + \dfrac{1}{5}\left(\dfrac{2_n}{n^2+1}\right)^5 + ...\infty$.

3. Find the eigen values and eigen vectors of $A = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 3 & -1 \\ 0 & -1 & 3 \end{pmatrix}$

4. Show that $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$ is orthogonal.

5. Prove that $\tan \tan h^{-1} x = \frac{1}{2}\log\left(\dfrac{1+x}{1-x}\right)$.

6. Expand $\cos 7\theta$ in terms of $\cos\theta$.

7. Find the value of y corresponding to x=2 from the following table ,

X	1	3	5	7
Y	1	27	125	343

8. Separate into real and imaginery parts $\cos(x+iy)$ and $\sin(x+iy)$.

Section B

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

9. Verify Caylay-hamilton theorem for the matrix $A = \begin{pmatrix} 8 & -8 & 2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{pmatrix}$

10. Prove that $\cos 8\theta = 1 - 32\sin^2\theta + 160\sin^4\theta - 256\sin 6\theta + 128\sin^8\theta$.

11. If $\sin(A+iB) = x+iy$, prove that $\dfrac{x^2}{\sin^2 A} - \dfrac{y^2}{\cos^2 A} = 1$ and $\dfrac{x^2}{\cos h^2 A} + \dfrac{y^2}{\sin h^2 A} = 1$.

Contd...

12. The population of a town in decennial census were as under estimate the population for the year 1965 and 1915,

Year	1911	1921	1931	1941	1951	1961	1971
Population(in thousands)	20	46	66	81	93	101	106

13. Sum to infinity of the series, $1+\dfrac{1}{3}+\dfrac{1.3}{3.6}+\dfrac{1.3.5}{3.6.9}+\ldots\ldots$

*****