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 EXAMINATION APRIL/NOV – 2021

SEMESTER - I

16UCHAT1MA1 - Allied Mathematics-I

Total Duration	**: 3 Hrs**	**Total Marks**	**: 75**
MCQ	: 30 Mins	MCQ	: 15
Descriptive	: 2 Hrs.30 Mins	Descriptive	: 60

Section B

Answer any ***SIX*** questions (6 × 5 = 30 Marks)

1. Sum the series $1+\frac{3}{2!}+\frac{5}{3!}+\frac{7}{4!}+\ldots$

2. Find the eigen values of $\begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$

3. Show that $2^4 \sin^5\theta = \sin 5\theta - 5\sin 3\theta + 10\sin\theta$.

4. Estimate $f(5)$ from the following data:

x :	3	4	5	6
$f(x)$:	4	13	--	43

5. If $\sin(\theta + i\varphi) = tan\alpha + isec\alpha$, prove that $cos2\theta cosh2\varphi = 3$.

6. If a, b, c are three consecutive integers, prove that
$$\log b = \frac{1}{2}\log a + \frac{1}{2}\log c + \frac{1}{2ac+1} + \frac{1}{3(2ac+1)^3} + \ldots$$

7. Verify Cayley Hamilton theorem for the matrix $A = \begin{bmatrix} 1 & 2 \\ 1 & 1 \end{bmatrix}$

8. Separate into real and imaginary parts of $\tan(x + iy)$.

Section C

Answer any ***THREE*** questions (3 × 10 = 30 Marks)

9. Sum the series $\frac{5}{3.6}+\frac{5.7}{3.6.9}+\frac{5.7.9}{3.6.9.12}+\ldots$

10. Verify Cayley Hamilton theorem for $A = \begin{pmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{pmatrix}$ and hence find A^{-1}

Contd…

11. Prove that $\dfrac{\sin 7\theta}{\sin \theta} = 64\cos^6 \theta - 80\cos^4 \theta + 24\cos^2 \theta - 1$.

12. Find y_6 if $y_0 = 9,\ y_1 = 18,\ y_2 = 20,\ y_3 = 24$, given that the third differences are constant.

13. Prove that $tanh^{-1} x = \dfrac{1}{2} log_e \left(\dfrac{1+x}{1-x} \right)$.