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.Mathematics - END SEMESTER EXAMINATIONS - NOV'2024
SEMESTER - II
20UMACT2003 - Classical Algebra

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 $1 + \frac{3}{4} + \frac{3.5}{4.8} + \frac{3.5.7}{4.8.12} + ...$
2. Sum the series $1 + \frac{1+3}{2!} + \frac{1+3+3^2}{3!} + \frac{1+3+3^2+3^3}{4!} + ... \; to \; \infty$
3. Solve the equation $x^4 + 4x^3 + 5x^2 + 2x$ - 2 = 0 given that one of the roots is -1 + $\sqrt{-1}$.
4. Frame an equation with rational coefficients, one of whose roots is $\sqrt{5} + \sqrt{2}$.
5. Remove the fractional coefficients from the equation $x^3 + \frac{1}{4}x^2$ - $\frac{1}{16}x + \frac{1}{72} = 0$
6. Find the roots of the equation $x^5 + 4x^4 + 3x^3 + 3x^2 + 4x + 1 = 0$
7. Find the eigen value and eigen vectors of the matrix $\begin{bmatrix} 2 & -2 & 3 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$
8. Find the smallest number with 18 divisors.

Section C

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

9. Show that $\frac{5}{1.2.3} + \frac{7}{3.4.5} + \frac{9}{5.6.7} + ...\infty = 3log2 - 1.$
10. Solve the equation $81x^3$ - $18x^2$ - $36x$ + 8 =0 whose roots are in harmonic progression.
11. Diminish the roots of x^4 - $5x^3$ + $7x^2$ - $4x$ + 5 = 0 by 2.
12. Find the characteristic equation of the matrix A = $\begin{bmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{bmatrix}$ and hence determine its inverse, using cayley-Hamilton theorem.
13. Show that if x and y are both prime to the prime number n, then x^{n-1} - y^{n-1} is divisible by n.

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