THE AMERICAN COLLEGE, MADURAI

(An Autonomous Institution Affiliated to Madurai Kamaraj University)

Re-accredited (2nd Cycle) by NAAC with Grade "A", CGPA – 3.46 on a 4-point scale

Backlog Arrear Examination, March 2021

MAT/ MAS 1511 / 1443 / 1633 / 135 Classical Algebra

Duration: 3 Hrs **Marks: 75**

Part-A

Answer any five questions: **5*15=75**

1. Solve the equation $27x^3 + 42x^2 - 28x - 8 = 0$ whose roots are in geometric progression.
2. Using Horner's method, find the real root of the equation $x^3 - 3x + 1 = 0$ which lies between 1 and 2 correct to three places of decimals.
3. Sum the series $\frac{2}{1.4.5} + \frac{3}{2.5.6} + \frac{4}{3.6.7} + ...\text{to n terms}$.
4. State Cayley Hamilton's theorem and hence find A^4 and A^{-1} for the matrix $A = \begin{bmatrix} 1 & 0 & -2 \\ 2 & 2 & 4 \\ 0 & 0 & 2 \end{bmatrix}$.
5. Find the Eigen values and Eigen vectors of the matrix $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$.
6. a) Find the condition that the general biquadratic equation $ax^4 + 4bx^3 + 6cx^2 + 4dx + e = 0$ may have two pairs of equal roots.
   b) If α, β, γ are the roots of the equation $x^3 + px^2 + qx + r = 0$, Find the equation whose roots are $\beta + \gamma - 2\alpha, \gamma + \alpha - 2\beta\ \alpha + \beta - 2\gamma$.
7. a) Show that $\frac{5}{1.2.3} + \frac{7}{3.4.5} + \frac{9}{5.6.7} + ...\text{to}\infty = 3\log 2 - 1$
   b) State and prove Weierstrass inequality.

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