B.Sc DEGREE EXAMINATION,APRIL 2019
I Year II Semester
Classical Algebra

Time : 3 Hours **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. Write the expansion of $(1+x)^n$.
2. Write down the expansion for $\frac{(e^x + e^{-x})}{2}$.
3. If $\sqrt{2}-\sqrt{7}$ is a root of an equation , what are the other roots of that equation?
4. Find one root of the equation $x^3 - 9x^2 + 23x + 5 = 0$ if the roots are in arithmetic progression.
5. Define a reciprocal equation.
6. Change the equation $2x^4 - 3x^3 + 3x^2 - x + 2 = 0$ into another coefficient of whose highest term will be unity.
7. What do you mean by diagonalizing the matrix A.
8. State Cayley-Hamilton theorem.
9. Give an example for a symmetric matrix.
10. State Fermat's Theorem.
11. State Wilson's theorem.
12. When do you say that the integers a and b are congruent?

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. Sum the series $1 + \frac{2}{6} + \frac{2.5}{6.12} + \frac{2.5.8}{6.12.18} + \ldots$
14. Find the equation with rational coefficients whose roots are $4\sqrt{3},\ 5+2i$.
15. Remove the fractional coefficients from the equation $x^3 - \frac{1}{4}x^2 + \frac{1}{3}x - 1 = 0$
16. Show that the product of two orthogonal matrices is orthogonal.
17. Find the number of integers less than n and prime to it when $n = 729$ and $n = 720$.
18. Obtain the characteristic equation of $\begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ and use it to calculate its inverse.

19. Solve the equation $x^3 - 19x^2 + 114x - 216 = 0$ given that the roots are in geometric progression.

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. Find the sum to infinity of the series $\frac{4}{18} + \frac{4.12}{18.27} + \frac{4.12.20}{18.27.36} + \ldots$
21. One root of the equation $3x^5 - 4x^4 - 42x^3 + 56x^2 + 27x - 36 = 0$ is $\sqrt{2} + \sqrt{5}$. Find the remaining roots.
22. Solve the equation $6x^5 - x^4 - 43x^3 + 43x^2 - x - 6 = 0$.
23. Find the eigen values and eigen vectors of the matrix $\begin{bmatrix} 11 & -4 & -7 \\ 7 & -2 & -5 \\ 10 & -4 & -6 \end{bmatrix}$.
24. Find the product of all divisors of N.

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