B.Sc. DEGREE EXAMINATION,NOVEMBER 2019
II Year III Semester
Allied Mathematics-I

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

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

Answer any **TEN** questions

1. Write the expansion of $(1-x)^{\frac{-p}{q}}$.
2. Expand log (1+ x).
3. Find the Eigen values of $\begin{pmatrix} 3 & 2 \\ 2 & 3 \end{pmatrix}$
4. State Cayley-Hamilton theorem.
5. Evaluate $\lim_{x\to 0} \frac{x-\sin x}{x^3}$.
6. Give the expansion of $\tan n\theta$.
7. State Newton's Forward Interpolation formula.
8. State Lagrange's Interpolation formula.
9. Prove that $\tanh 2x = \frac{2\tanh x}{1+\tanh^2 x}$.
10. Show that $\sin^{-1} x = \log(x + \sqrt{x^2+1})$.
11. Find the characteristic equation of A $= \begin{pmatrix} 2 & 0 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{pmatrix}$
12. Expand $\cos 6\theta$.

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

Answer any **FIVE** questions

13. Show that $1 + \frac{1+3}{2!} + \frac{1+3+3^2}{3!} + \frac{1+3+3^2+3^4}{4!} + \ldots\ldots = \frac{e\left(e^2-1\right)}{2}$
14. Using Cayley-Hamilton theorem, find A $^{-1}$ when A $= \begin{bmatrix} \mathbf{1} & \mathbf{0} & \mathbf{3} \\ \mathbf{2} & \mathbf{1} & \mathbf{-1} \\ \mathbf{1} & \mathbf{-1} & \mathbf{1} \end{bmatrix}$
15. Express $\frac{\sin 7\theta}{\sin\theta}$ as a polynomial in $\cos\theta$.
16. Find the missing term for the following data.

    X: 0 5 10 15 20 25

    Y: 7 11 14 ? 24 32

17. If $\sin(A+iB) = x+iy$, then , Show that
    (a.) $\frac{x^2}{\sin^2 A} - \frac{y^2}{\cos^2 A} = 1$
    (b.) $\frac{x^2}{\cosh^2 B} + \frac{y^2}{\sinh^2 B} = 1$
18. Show that $\frac{1}{1.2} + \frac{1}{3.4} + \frac{1}{5.6} + \cdots = log2$.
19. Express $\begin{pmatrix} 2 & 4 & 8 \\ 6 & 2 & 8 \\ 2 & 2 & 2 \end{pmatrix}$ as a sum of symmetric and skew-symmetric matrix.

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

Answer any **THREE** questions

20. Sum to infinity the series $\frac{7}{9} + \frac{7.9}{9.12} + \frac{7.9.11}{9.12.15} + \ldots$.
21. Find the Eigen values and Eigen vectors of $A = \begin{pmatrix} 3 & -1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{pmatrix}$
22. Show that
    $-2^{10}\cos^5\theta\sin^6\theta = \cos 11\theta - \cos 9\theta - 5\cos 7\theta + 5\cos 5\theta + 10\cos 3\theta - 10\cos\theta$.
23. Using Newton's formula find the value of y when x = 27 from the following data

X	10	15	20	25	30
Y	35.4	32.2	29.1	26.0	23.1

24. $If\ \tan(\theta + i\emptyset) = x + iy,\ \ then\ show\ that$
    (a.) $x^2 + y^2 + 2y\cot 2\theta = 1$
    (b.) $x^2 + y^2 - 2y\coth 2\emptyset = 1$

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