B.Sc. DEGREE EXAMINATION,NOVEMBER 2018
I Year I Semester
Allied Paper -I
ALLIED MATHEMATICS -I

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

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

Answer any **TEN** questions

1. Expand $(1+x)^n$
2. Evaluate $\frac{e^x + e^{-x}}{2}$
3. Define Symmetric Matrix.
4. Find the product of eigen values of the following matrix:
$\begin{pmatrix} 1 & 2 & -1 \\ -2 & 0 & 0 \\ 4 & 5 & 0 \end{pmatrix}$
5. State Cayley Hamilton theorem.
6. Find $\cos 6\theta$.
7. Expand $\tan n\theta$.
8. Prove that $E\Delta = \Delta E$.
9. Write down Newton's Forward Interpolation formula.
10. State Lagrange's Interpolation formula.
11. Prove that $\cosh^2 x + \sinh^2 x = \cosh 2x$.
12. Prove that $\sinh^{-1} x = \log(x + \sqrt{x^2+1})$.

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

Answer any **FIVE** questions

13. Write the coefficient of x^n in the expansion of $\frac{2+5x}{e^{2x}}$.
14. Show that $\frac{a-x}{a} + \frac{1}{2}\left(\frac{a-x}{a}\right)^2 + \frac{1}{3}\left(\frac{a-x}{a}\right)^3 + \ldots\ldots = \log a - \log x$.
15. Express $\begin{pmatrix} 2 & 4 & 8 \\ 6 & 2 & 8 \\ 2 & 2 & 2 \end{pmatrix}$ as the sum of a symmetric matrix and a skew symmetric matrix.

16. Find the eigen values of $\begin{pmatrix} 7 & 0 & -2 \\ 0 & 5 & -2 \\ -2 & -2 & 6 \end{pmatrix}$

17. Express $\frac{sin5\theta}{sin\theta}$ as a polynomial in cosθ.

18. Given the following values for x and y

x	0	1	2	3	4	5
y	3	12	81	200	100	8

Find $\triangle^5 y_0$.

19. If tan $\frac{x}{2}$ = tanh $\frac{x}{2}$, then show that cosx coshx=1.

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

Answer any **THREE** questions

20. Sum the series $\frac{1}{10} + \frac{1.4}{10.20} + \frac{1.4.7}{10.20.30}$+.....

21. Using Cayley Hamilton Theorem, find A^4 given that A= $\begin{pmatrix} 2 & -2 & 1 \\ 0 & 1 & 2 \\ 1 & 0 & 1 \end{pmatrix}$

22. Show that -$2^6 \sin^7\theta$= sin7θ-7 sin5θ+21 sin 3θ-35 sinθ.

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 cos(A+iB) = x+iy, then show that

(a) $\frac{x^2}{cos^2A}$ - $\frac{y^2}{sin^2A}$= 1

(b) $\frac{x^2}{cosh^2B} + \frac{y^2}{sinh^2B}$= 1.

B.Sc. DEGREE EXAMINATION,NOVEMBER 2018
I Year I Semester
Allied Paper -I
ALLIED MATHEMATICS -I

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

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

Answer any **TEN** questions

1. Expand $(1+x)^n$
2. Evaluate $\frac{e^x + e^{-x}}{2}$
3. Define Symmetric Matrix.
4. Find the product of eigen values of the following matrix:
$\begin{pmatrix} 1 & 2 & -1 \\ -2 & 0 & 0 \\ 4 & 5 & 0 \end{pmatrix}$
5. State Cayley Hamilton theorem.
6. Find $\cos 6\theta$.
7. Expand $\tan n\theta$.
8. Prove that $E\Delta = \Delta E$.
9. Write down Newton's Forward Interpolation formula.
10. State Lagrange's Interpolation formula.
11. Prove that $\cosh^2 x + \sinh^2 x = \cosh 2x$.
12. Prove that $\sinh^{-1} x = \log(x + \sqrt{x^2+1})$.

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

Answer any **FIVE** questions

13. Write the coefficient of x^n in the expansion of $\frac{2+5x}{e^{2x}}$.
14. Show that $\frac{a-x}{a} + \frac{1}{2}\left(\frac{a-x}{a}\right)^2 + \frac{1}{3}\left(\frac{a-x}{a}\right)^3 + \ldots\ldots = \log a - \log x$.
15. Express $\begin{pmatrix} 2 & 4 & 8 \\ 6 & 2 & 8 \\ 2 & 2 & 2 \end{pmatrix}$ as the sum of a symmetric matrix and a skew symmetric matrix.

16. Find the eigen values of $\begin{pmatrix} 7 & 0 & -2 \\ 0 & 5 & -2 \\ -2 & -2 & 6 \end{pmatrix}$

17. Express $\frac{sin5\theta}{sin\theta}$ as a polynomial in cosθ.

18. Given the following values for x and y

x	0	1	2	3	4	5
y	3	12	81	200	100	8

Find $\triangle^5 y_0$.

19. If tan $\frac{x}{2}$ = tanh $\frac{x}{2}$, then show that cosx coshx=1.

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

Answer any **THREE** questions

20. Sum the series $\frac{1}{10} + \frac{1.4}{10.20} + \frac{1.4.7}{10.20.30}$+.....

21. Using Cayley Hamilton Theorem, find A^4 given that A= $\begin{pmatrix} 2 & -2 & 1 \\ 0 & 1 & 2 \\ 1 & 0 & 1 \end{pmatrix}$

22. Show that -$2^6 \sin^7\theta$= sin7θ-7 sin5θ+21 sin 3θ-35 sinθ.

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 cos(A+iB) = x+iy, then show that

(a) $\frac{x^2}{cos^2A}$ - $\frac{y^2}{sin^2A}$= 1

(b) $\frac{x^2}{cosh^2B} + \frac{y^2}{sinh^2B}$= 1.