B.Sc.DEGREE EXAMINATION,APRIL 2020
I Year I 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 log(1+x).
2. Write down the Maclaurin's Series for e^x.
3. Define an Orthogonal matrix.
4. Define Symmetric matrix and given an example.
5. If x= $cos\theta + sin\theta$ find $x^4 + \frac{1}{x^4}$.
6. If $\frac{sin\theta}{\theta} = \frac{2165}{2166}$show that θ is nearly 3°, 1^1.
7. Show that $E = 1 + \triangle$.
8. Write down the Lagrange's formula.
9. Show that $cosh^2x - sinh^2x = 1$.
10. Show that sinh2x = 2sinhx coshx.
11. Find the sum of the Eigen values of the matrix $\begin{bmatrix} 15 & -1 & 2 \\ 2 & 11 & 3 \\ 3 & 2 & 23 \end{bmatrix}$.
12. Show that if $cos(\frac{\pi}{3} + \theta) = 0.49$, then $\theta is 40^1$ is nearly.

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

Answer any **FIVE** questions

13. Sum the series $1 + \frac{1}{3} + \frac{1.3}{3.6} + \frac{1.3.5}{3.6.9} + \ldots..$
14. Find the Eigen value of the matrix $\begin{pmatrix} 0 & 1 & 1 \\ -4 & 4 & 2 \\ 4 & -3 & -1 \end{pmatrix}$.
15. Show that $-2^5 sin^6\theta = cos6\theta - 6cos4\theta + 15cos2\theta - 10$.
16. Find the value of y when $x = 8$ from the following data. $\begin{pmatrix} \text{x:} & 0 & 5 & 10 & 15 & 20 & 25 \\ \text{y:} & 7 & 11 & 14 & 18 & 24 & 32 \end{pmatrix}$
17. Show that $sinh^{-1}x = log(x + \sqrt{x^2 + 1})$.

18. Evaluate $\lim_{x\to 0} \dfrac{x - \sin x}{x^3}$.

19. If A $= \begin{pmatrix} cosx & sinx \\ -sinx & cosx \end{pmatrix}$ then Show that A is an orthogonal matrix.

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

Answer any **THREE** questions

20. Sum the series $\sum_{n=0}^{\infty} \dfrac{5n+1}{(2n+1)!}$

21. Verify Cayley Hamilton theorem for the matrix $\begin{pmatrix} 1 & -1 & 2 \\ -2 & 1 & 3 \\ 3 & 2 & -3 \end{pmatrix}$.

22. Show that $\frac{sin6\theta}{sin\theta} = 32cos^5\theta - 32cos^3\theta + 6cos\theta$.

23. Find a polynomial to the following data and hence find y(10) using Lagrange's interpolation formula:

x	5	6	9	11
Y	12	13	14	16

24. If $\sin(A + iB) = x + iy$, then Show that

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

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

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