

UNIT TEST -I

APPLIED MATHS-I

MARKS-20

SET -B

Note-1. Attempt Any Five Questions.

2. Each Question carries equal marks.

Q1. Show that $(4n)^{tn}$ power of $\frac{1+i}{(2-i)^2}$ is equal to $(-4)^n$ where n is positive Integer.

Q2. Solve the equation $x^5 + 1 = 0$

Q3. Show that every square matrix can be uniquely expressed as a sum of Hermitian and skew Hermitian matrix.

Q4. Reduce the following matrix to normal form, and hence find its rank

$$A = \begin{bmatrix} 2 & -3 & 1 & 2 \\ 3 & 1 & 3 & 2 \\ 3 & 2 & 1 & 2 \\ 6 & 3 & 4 & 4 \end{bmatrix}$$

Q5. For the following matrix A, find non singular matrices P and Q such that PAQ

is in normal form $A = \begin{bmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{bmatrix}$

Q6. Show that the system of equations $2x-2y+z = \lambda x$, $2x-3y+2z = \lambda y$, $-x+2y = \lambda z$ can possess the non-trivial solution only if $\lambda = 1$, $\lambda = -3$.

Q7. Solve the following equations by Gauss Seidel method

$$10x+y+z=12, 2x+10y+z=13, 2x+2y+10z=14$$

Q8. If $5 \sinh x - \cosh x = 5$, find $\tanh x$

Q9. Prove that $\tanh^{-1}(x) = \sinh^{-1} \frac{x}{\sqrt{1-x^2}}$

Q10. Prove that $\log \left(\frac{x+iy}{x-iy} \right) = 2i \tan^{-1} \left(\frac{y}{x} \right)$.