Assignment (Unit-I)

Subject Name: Mathematics-I **Subject Code: BCA-1005**
Teacher's Name: Dr Raghwendra Singh **Class/Branch: BCA**

---

1 Find the Value of x if $\begin{vmatrix} 2 & 4 \\ 5 & 1 \end{vmatrix} = \begin{vmatrix} 2x & 4 \\ 6 & x \end{vmatrix}$

2 Prove that, $\det\begin{pmatrix} -a^2 & ab & ac \\ ba & -b^2 & bc \\ ca & cb & -c^2 \end{pmatrix} = 4a^2b^2c^2$

3 Solve $\begin{bmatrix} y \\ 3x \end{bmatrix} = \begin{bmatrix} 6-2x \\ 31+4x \end{bmatrix}$ for x and y.

4 If $\mathbf{A} = \begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$ and $\mathbf{B} = \begin{bmatrix} 2 & 1 \\ 1 & 1 \end{bmatrix}$ Find **AB** and **BA**.

5 Evaluate the rank of the following matrices:

a) $\begin{bmatrix} 4 & 2 & 3 \\ 8 & 4 & 6 \\ -2 & -1 & -1.5 \end{bmatrix}$ (b) $\begin{bmatrix} 8 & 1 & 3 & 6 \\ 0 & 3 & 2 & 2 \\ -8 & -1 & -3 & 4 \end{bmatrix}$ (c) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$ (d) $\begin{bmatrix} 1 & 0 \\ 3 & 2 \\ 7 & 2 \\ 8 & 1 \end{bmatrix}$ (e) $\begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 4 & 3 \\ 3 & 0 & 5 & -10 \end{bmatrix}$

6 Find the value of k such that rank of $\begin{bmatrix} 1 & 2 & 3 \\ 2 & k & 7 \\ 3 & 6 & 10 \end{bmatrix}$ is 2.

7 Using rank method, find whether the following equations are consistent or not, $x + y + 2z = 4,\ 2x - y + 3z = 9,\ 3x - y - z = 2$. If consistent, solve them.

8 Find the values of a and b for which the system $x + 2y + 3z = 6, x + 3y + 5z = 9, 2x + 5y + az = b$ has (i) no solution (ii) unique solution (iii) infinite number of solutions. Also, find the solutions in case (i) and (ii).

9 Find the value of λ, for which the system $3x - y + 4z = 3, x + 2y - 3z = -2, 6x + 5y + \lambda z = -3$ will have infinite number of solutions and solve them with that λ value.

10 Determine k such that system $2x + y + 2z = 0, x + y + 3z = 0, 4x + 3y + kz = 0$ has Trivial Solution (II) Non-Trivial Solution

11 Find the eigenvalues and eigenvectors of the matrix

(a) $\begin{bmatrix} 1 & -1 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & -1 \end{bmatrix}$ (b) $\begin{bmatrix} 1 & -2 \\ 2 & 0 \end{bmatrix}$ (c) $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 1 \\ 3 & 2 & 3 \end{bmatrix}$ (d) $\begin{bmatrix} 1 & 2 & 2 \\ 0 & 2 & 1 \\ -1 & 2 & 1 \end{bmatrix}$ (e) $\begin{pmatrix} k & k & k \\ k & k & k \\ k & k & k \end{pmatrix}$, for fixed real k.

12 Verify Cayley Hamilton theorem for the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 5 & 6 \end{bmatrix}$. Also, find the inverse using this theorem.

13 Using Cayley Hamilton theorem find A^{-2}, where $A = \begin{bmatrix} 1 & 2 & 0 \\ 2 & -1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$.

Assignment (Unit-I)

Subject Name: Mathematics-I **Subject Code: BCA-1005**
Teacher's Name: Dr Raghwendra Singh **Class/Branch: BCA**

14 If $A = \begin{bmatrix} 1 & 2 & -1 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$. Verify Cayley Hamilton theorem. Also, find A^{-1} and A^4

15 If $A = \begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$ then, using Cayley Hamilton theorem, express $A^6 - 4A^5 + 8A^4 - 12A^3 + 14A^2$ as a linear polynomial in A.