**Unit No 1**

1. **Write a python program for addition subtraction multiplication of complex numbers 4+2j and 3-6j.**
2. Define : **Galois Field**, **Dot Product**, **convex combination**, span,
3. **Write a python program to find conjugate of complex number.**
4. **Are the following vectors are linearly dependent v1=(3, 2, 7), v2=(2,4,1) and v3=(1,–2,6)**
5. **Check whether the vectors are linearly dependent v1=(1, –2, 1), v2=(2, 1, –2) and v3=(7, –4, 1)**
6. **Express in polar and exponential form 1 + i √3**
7. **Find the square root of complex number 8 – 6i**
8. **Find the square root of complex number –5 + 12i**
9. **Find the Square root of 21 – 20i, where i= √−1**
10. **Express [(3 + 2i)/(2 + i)(1 – 3i)] in the form x + iy**
11. **Solve the following system by backward substitution method 1x1-3x2-2x3=7, 2x2+4x3 = 4, -10x3 = 12**
12. **Write a python program to solve system of linear equations given below 1x1-3x2-2x3=7, 2x2+4x3 = 4, -10x3 = 12**
13. **Determine whether v1=(2, 2, 2), v2=(0, 0, 3) and v3=(0, 1, 1) span vector space R3.**
14. **Show that vectors v1=(1, 0, 1), v2=(2, 1, 4) and v3=(1, 1, 3) do not span vector space.**
15. **Write a python Program for rotating a complex number Z = 2+3i by 180o.**
16. **Write a Python program to rotate a complex no by 90⁰, 180⁰ and 270⁰**
17. **Which of the following is a set of generators of R3**

**i) {( 4, 0,0), (0,0,2)} ii) {( 1, 0,0), (0,1,0), (0,0,1)}**

1. **Express the following as a linear combination of v1=(–2, 1, 3), v2=(3, 1, –1) and**

**v3=(–1, –2, 1) with w= (6, –2, 5)**

**Unit No 2**

1. **Define : Identity matrix, Symmetric Matrix, Null Space, Inner Product, Outer Product,** **Forest, Spanning Subgraph, Spanning Subgraph, cycle, path, Basis,** Row rank of Matrix, Column rank of Matrix.
2. Prove that, For any vector v belongs to v ∊ V; there is exactly one representation of v in terms of the basis vectors. If a1, a2, . . . ., an be a basis for a vectorspace V.
3. **Find the coordinate representation of v=[1,3,5,3] in terms of a1 = [1,1,0,0], a2=[0,1,1,0], a3=[0,0,1,1]**
4. **Find the coordinate representation of v=[0,0,0,1] in terms of the vectors [1,1,0,1], [0,1,0,1] and [1,1,0,0] in GF(2)**
5. **Write a program in python to multiply two matrices using nested loops.**
6. **Write python code to print diagonal matrix with diagonal elements [1,2,3,4]**
7. **Find the null space of matrix A = [ [1 5 6]**

**[2 6 8]**

**[3 4 7] ]**

1. **Write dot product definition of matrix-vector multiplication with an example.**
2. **Write dot product definition of vector-matrix multiplication with an example.**
3. **Write a python code to check whether a given matrix M=[ [1,3,5], [3,2,4],[5,4,1]]**

**is a symmetric matrix.**

1. **Find the dimension of the vector space spanned by the vectors (1, 1, –2, 0, –1),**

**(1, 2, 0, –4, 1), (0, 1, 3, –3, 2), (2, 3, 0, –2, 0) and also find the basis.**

1. **Check whether the set of functions are Linearly independent?**

**2 – x + 4x2, 3 + 6x + 2x2, 2 + 10 x – 4x2.**

1. **Write a python program to enter a matrix and check if it is invertible.**

**if invertible exists then find inverse.**

1. **Show that vector {(1, 2, 1), (2, 1, 0), (1, –1, 2)} of R3 form a basis of R3**
2. **Find the dimension and a basis of the solution space W of each of the homogeneous system**

**X + 2y + z - 2t = 0, 2x + 4y + 4z - 3t = 0, 3x - 6y + 7z - 4t = 0**

1. **Find the dimension and a basis of the solution space W of each of the homogeneous system**

**x + y + 2z = 0, 2x +3y + 3z = 0, x + 3y + 5z = 0**

1. **Solve the system of equations using matrix form : 3x + 4y = 1; 2x + 1y = 0**

**Unit No 3**

1. **Solve the following system using Gaussian elimination method. v - w = 3 ; -2u + 4v - w = 1 ; -2u + 5v -4w = -2**
2. **Solve the following system using Gaussian elimination method. x + y + z = 1 ; x + 2y + 2z = 1 ; x + 2y + 3z = 1**
3. **Solve the following system using Gaussian elimination method. 4y - 3 z = 3 ; -x + 7y - 5z = 4 ; -x + 8y - 6z = 5**
4. **Express the following as a linear combination of v1=(–2, 1, 3), v2=(3, 1, –1) and v3=(–1, –2, 1) with w= (6, –2, 5)**
5. **Find eigen Values and eigen vectors of 8 –8 –2 A = 4 –3 –2 3 –4 1**
6. **Check whether the following set {(1,1,0), (0,1,1), (1,1,1)} is linearly Independent or not.**
7. **Find eigen values and eigen vectors of [ 3 −1 1 −1 3 −1**  **1 −1 3 ]**
8. **Write a python program to convert a 2 × 2 matrix to row echelon form.**
9. **Construct an orthonormal basis of R2 by Gram Schmitt Process S = {(3, 1), (4, 2)}** .
10. **Find eigen Values and eigen vectors of A = [ 12 -51 2 -11]**
11. **Construct an orthonormal basis of R2 by Gram Schmitt Process S = {(3, 1), (4, 2)}**
12. **Convert the following matrix in echelon form : [1 0 1 2 -1 3 4 3 2]**
13. **Write a python program for prime factorization of integer given by user.**
14. **Write a python program to find orthogonal projection u on v.**
15. **Find the projection of u on v : a. u =[1 1] v=[1 0] b. u= [0 1] v=[√2/2, √2/2]**
16. **Construct an orthogonal set of generators for subspace of R4 whose generators are v1, v2, v3. v1=(1, 1, 1, 1) v2=(1, 2, 4, 5) v3=(1, -3, -4, -2)**  
    Construct an orthogonal set of generators for subspace of R4 whose generators are v1, v2, v3. v1=(1, 1, 1, 1) v2=(1, 2, 4, 5) v3=(1, -3, -4, -2)