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Department of Computer Science
Question Bank,2023-2024
Subject: Mathematics(Linear Algebra)
Class:B.Sc.CS.(Entire)-II

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1) Show that intersection of two subspaces is again a subspace.

2) State and prove triangle inequality.

3) A non-empty subset S of a vector space V over the field F is subspace of v iff $\propto x + \beta y \in S$, $for\ all\ \alpha, \beta \in F$ & $x, y \in$ S

4) Solve the following system using Gauss- elimination method.

$$x_1+x_2+x_3 = 4$$

$$x_1-x_2+2x_3 = 3$$

$$2x_1+3x_2-x_3 = 6$$

5) Verify Cayley – Hamilton theorem for the matrix.

A = [3 − 2 − 1 2]

6) Show that S = {(1,0,0), (0,1,0), (0,0,1)} is a basis of R 3

7) State & prove Cauchy Schwarz's inequality.

8) Find eigen values and eigen vectors for the following matrix.

A = [2 1 0 0 1 − 1 0 2 4]

9) Let S= {VI,V2,••••..,vn) be a set of vectors in a vector space V, then prove that
   (I)L(S) is a subspace of v.
   (II)L(S) is the smallest subspace of v containing S.

10)If T : V U is a linear transformation then show that range of Tis a subspace of U.

11)State and prove triangle inequality.

12)

12)A non-empty subset S of a vector space V over the field F is subspace of v iff cc x+ßy G S, for all e F & x, y e S

13)Show that intersection of two subspaces is again a subspace.

14) Obtain A^{-1}, if it exists for

$$A = [3\ 1\ 5\ 2\ 4\ 1\ \ -4\ 2\ \ -9]$$

15) Let A be an nxn matrix. The following are equivalent

(a) A is invertible

(b) AX=B is consistent, for every nx1 matrix B

16) Find the value of α for which the system

$\alpha x+y+z= 1$

$x+\alpha y+z = 1$

$x+y+\alpha z = 1$

17) Prove that Every orthogonal set of non zero vectors in an inner product Space is linearly independent.

18) Define: (I) Basis

(II) Dimension

19) Consider the Euclidean inner product space R^2. Transform the basis $\{u_1, u_2\}$ into an orthonormal basis, where

$u_1 = (4,-3)$, $u_2 = (1,-1)$

20) Define : (I) Kernel of T

(II) Range of T

21) Let $T: V \rightarrow W$ be a linear transformation ,then prove that

T(-u) = - T(u), for every uεV

22) If $T: V \rightarrow W$ is a linear transformation ,then prove that ker(T) is a subspace Of V

23) If $v_1, v_2, \ldots, v_n$ are vectors in a vector space V, then prove that the set W of all Linear combinations of $v_1, v_2, \ldots, v_n$ is a subspace of V

24) Define linear span. Give one example.

25) If $T: V \rightarrow W$ is a linear transformation ,then prove that R(T) is a subspace Of V

26) If u & v are any two vectors in an inner product space , then

$$< u, v >^{2} \leq < u, u > \quad < v, v >$$

27) State & prove triangle inequality.

28) Determine whether the following system has unique solution or not

p+3q+5r+s= 0

4p-7q-3r-s= 0

3p+2q+7r+8s=0

29) Prove that : A system of linear equation has no solution, exactly one solution Or infinitely many solution.

30) Define : (i) system of linear equations

(ii) consistant system

31) Reduce the following matrix to row echelon form

A = [1 2 3 2 5 3 1 0 8]

32)Define : (i) Eigem values

(ii) Eigen vectors

33) State & prove Pythagoras theorem

34) Define : (i) Linearly Independent

(ii) Linearly dependent

35) State & prove Cauchy – Schwarz inequality.

36) Find eigen values and eigen vectors for the following matrix.

A = [3 1 3 2 4 2 1 1 3]

37)Verify Cayley- Hamilton theorem for the following matrix.

$$[3 \quad -74 \quad -5]$$

38) Define : (i) Vector Space

(ii) Linear transformation

39) State and prove triangle inequality.

40) Show that range of T Is a subspace of V