**(Unit-II: Vector Space-I)**

**School of Applied and Basic Sciences**

**Course Name: Linear Algebra and Differential Equations**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Serial No. | Questions | CO | Bloom | Difficulty | Competitive Exam Question Y/N | Area | Topic | Unit | Marks |
| 1 | Define vector space and give example? | CO2 | KI | L | N | Vector Space | Definition  Definition  Based  Problems  Definition  Definition  Definition  Based problem  Definition  Based problem  Definition  Based problem  Definition  Based problem | II | **2** |
| 2 | Show that is not a vector space over the field R with respect to the operations of vector addition (a, b) + (c, d) = (a+c, b+d) and scalar multiplication k(a, b) = (ka, b)? | CO2 | KI | L | N | Vector Space | II | **2** |
| 3 | Show that the set of polynomials of degree with real coefficients form a vector space? | CO2 | K3 | M | N | Vector Space | II | **2** |
| 4 | Show that union of two sub space of a vector space need not be a sub space of that vector space. | CO2 | K3 | M | Y | Vector Space | II | **2** |
| 5 | Discuss whether or not is a subspace of**?** | CO2 | K3 | M | Y | Sub Space | II | **2** |
| 6 | Show that W is a subspace of, where W is the *x-y* plane which consists of those vectors whose third components is zero i.e.; | CO2 | K3 | M | N | Sub Space | II | **2** |
| 7 | Let C be the set of all continuous real-valued functions defined on R and let D be the set of all differentiable real-valued functions defined on R. Show that C and D are subspaces of F, the vector space of all real-valued functions defined on R. | CO2 | K3 | M | N | Sub Space | II | **2** |
| 8 | Is W a subspace of A? where  and A is set of matrices of order 2. | CO2 | K3 | H | N | Sub Space | II | **2** |
| 9 | Define linear combination in a vector space. | CO2 | K1 | L | N | Linear combination  of  Vector | II | **2** |
| 10 | Define linear span of a vector space**.** | CO2 | K1 | M | N | Linear span  of  Vector | II | **2** |
| 11 | Describe geometrically span (u), where u is a non-zero vector in | CO2 | K3 | M | N | Linear span  of  Vector | II | **2** |
| 12 | Describe geometrically span (u, v), where u and v are a non-zero vector in which are not multiple of each-other**?** | CO2 | K3 | M | N | Linear span  of  Vector | II | **2** |
| 13 | State the conditions under which set of vectors are  (i)Linearly independent  (ii)Linearly dependent | CO2 | K2 | L | N | Linearly Independence  of  Vector | II | **2** |
| 14 | If possible, write the vector in as a linear combination of vectors, and | CO2 | K3 | M | N | Linear combination  of  Vector | II | **6** |
| 15 | Determine whether or not the vectors are linearly dependent. | CO2 | K3 | M | N | Linearly Independence  of  Vector | II | **6** |
| 16 | Determine whether or not the vectors are linearly dependent. | CO2 | K3 | M | N | Linearly Independence  of  Vector | II | **6** |
| 17 | Determine whether or not the vectors are linearly dependent. | CO2 | KI | L | N | Linearly Independence  of  Vector | Definition  Based problem  Definition  Based problem  Definition  Based problem  Definition  Based problem  Definition  Based problem  Definition  Based problem  Definition  Based problem  Definition  Based problem  Definition  Based problem  Definition  Based problem  Definition  Definition  Based problem  problem  problem  Definition  Based problem  Definition  Based problem  Definition  Based problem | II | **6** |
| 18 | Show that the polynomials 1, *x* and *x2* span ? | CO2 | K3 | L | N | Linear span  of  Vector | II | **6** |
| 19 | Determine whether sin2x is in span(sin*x*, cos*x*). | CO2 | K3 | L | N | Linear span  of  Vector | II | **6** |
| 20 | In , determine whether r is in span(p(*x*), q(*x*)), where p and q. | CO2 | K3 | L | N | Linear span  of  Vector |  | **6** |
| 21 | In , determine whether, the set {, , } is linearly independent? | CO2 | K3 | L | N | Linear span  of  Vector |  | **6** |
| 22 | Determine whether the set {sin *x*, cos *x*} is linearly independent. | CO2 | K3 | L | N | Linear span  of  Vector |  | **6** |
| 23 | Determine whether, the set {A, B, C} is linearly dependent.  Where | CO2 | K3 | L | N | Linear span  of  Vector |  | **6** |
| 24 | Determine whether, the set {*x*, *x*, cos 2*x*} is linearly dependent. | CO2 | K3 | L | N | Linear span  of  Vector | II | **6** |
| 25 | show that the set {, , ,………} is linearly independent | CO2 | KI | L | N | Linearly Independence  of  Vector | II | **6** |
| 26 | Define basis and dimension of vector space. | CO2 | K2 | M | N | Linearly Independence  of  Vector | II | **6** |
| 27 | Show that the set {, , } is a basis for | CO2 | K2 | M | N | Linearly Independence  of  Vector | II | **6** |
| 28 | Find the coordinate vector [*p*(*x*)] of pwith respect to the basis {, , }. | CO2 | K3 | M | N | Linearly Independence  of  Vector | II | **6** |
| 29 | Find the coordinate vector [*p*(*x*)] of p with respect to the basis {, , }. | CO2 | K3 | M | N | Linearly Independence  of  Vector | II | **6** |
| 30 | Find the dimension of subspace {(x1, x2, x3, x4, x5): 3x1-x2 +x3 =0} of.  **[GATE2006]** | CO2 | K1 | L | N | **Basis and Dimension** | II | **2** |
| 31 | If  and  then find dimension of V? **[GATE2007]** | CO2 | K3 | L | N | **Basis** | II | **6** |
| 32 | If    then find basis of V? **[GATE2007]** | CO2 | K3 | M | N | Coordinate vector | II | **6** |
| 33 | Let V denote the vector space over R and  .  Then find dimension of V and W? **[GATE2014]**  **[To be discuss after Unit-IV]** | CO2 | K3 | M | N | Coordinate vector | II | **6** |
| 34 | Let mapping be defined by  .  Is T a linear transformation? | CO2 | K3 | M | N | Linear Transformation | II | **6** |
| 35 | Let the linear transformation be defined by  .  Then find range space, rank, kernel and nullity of F. | CO2 | K3 | L | N | Linear Transformation | II | **6** |
| 36 | Let the linear transformation be defined by  .  Then find nullspace of F. | CO2 | K3 | H | N | Linear Transformation | II | **6** |
| 37 | Let the linear transformation be defined by  .  Then find the dimension of the range space and null space of T, and . | CO2 | K3 | H | Y | Linear Transformation | II | **9/10** |
| 38 | If the nullity of the matrix is 1, then find the value of k? | CO2 | K3 | M | Y | Linear Transformation | II | **6** |
| 39 | Let the linear transformation be defined by  .  Then find nullity of T? | CO2 | K2 | M | Y | Linear Transformation | Definition  Based problem  Definition  Based problem  Definition  Based problem  Definition  Based problem  Definition  Based problem  Definition  Based problem  Definition  Based problem  Definition  Based problem  Definition  Based problem  Definition  Based problem | II | **6** |
| 40 | Let the linear transformation be defined by  .  Then find the dimension of the range space and null space of T? **[GATE2014]** | CO2 | K3 | M | Y | Linear Transformation | II | **9/10** |
| 41 | Let the linear transformation be defined by  .  Then find matrix of linear transformation T with respect to the ordered basis        b) | CO2 | K3 | H | Y | Matrix associated linear map | II | **9/10** |
| 42 | Let the linear transformation be defined by  .  Then find matrix of linear transformation T with respect to the ordered basis | CO2 | K3 | H | N | Matrix associated linear map | II | **9/10** |
| 43 | Let be the linear transformation such that and . Let be the linear transformation such that . Then find rank of **[GATE2014]** | CO2 | K3 | M | Y | Composition  of  linear map | II | **9/10** |
| 44 | Let the linear transformation be defined by  .  Then find the matrix representation of T with respect to the basis and of and respectively? | CO2 | K3 | H | Y | Matrix representation | II | **9/10** |
| 45 | Let the linear transformation S and be defined by  Where . Is S and T both one-one and onto? **[GATE2006]** | CO2 | K3 | M | Y | Linear Transformation | II | **9/10** |
| 46 | Let the linear transformation and be defined by  ,  .  If possible, then find SoT? | CO2 | K3 | H | N | Composition  of  linear map | II | **9/10** |
| 47 | Prove that the T: R3 to R3 defined by T(x,y,z) = (x+z, x-z,y) is invertible. | CO2 | K2 | M | N | Linear Transformation | Inverse of LT | II | **6** |
| 48 | Is inverse linear Transformation exist for T(x)=x? Domain is all real no. | CO2 | K2 | L | N | Linear Transformation | Inverse of LT | II | **2** |
| 49 | Is inverse linear Transformation exist for T(x)=x2 ? Domain is all real no | CO2 | K2 | L | N | Linear Transformation | Inverse of LT | II | **2** |

Signature of Course Coordinator:

Signature of PC:

Signature of Dean:

IQAC: