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| Serial No. | Question | CO | Bloom’s Taxonomy Level | Difficulty Level | Competitive Exam Question Y/N | Area | Topic | Unit | Marks |
| 1 | Show that v is an eigenvector of A and find the corresponding eigenvalue. | 3 | K2 | L | N | Eigenvalue problem | Eigenvalue, Eigenvector | 3 | 2 |
| 2 | Show that v is an eigenvector of A and find the corresponding eigenvalue | 3 | K2 | M | N | Eigenvalue problem | Eigenvalue, Eigenvector | 3 | 6 |
| 3 | Show that  is an eigenvalue of A and find one eigenvector corresponding to the eigenvalue. | 3 | K2 | L | N | Eigenvalue problem | Eigenvalue, Eigenvector | 3 | 2 |
| 4 | Show that  is an eigenvalue of A and find one eigenvector corresponding to the eigenvalue. | 3 | K2 | M | N | Eigenvalue problem | Eigenvalue, Eigenvector | 3 | 6 |
| 5 | Define characteristic polynomial for a square matrix. | 3 | K1 | L | N | Eigenvalue problem | Eigenvalue, Eigenvector | 3 | 2 |
| 6 | Define algebraic and geometric multiplicity of the eigenvalue. | 3 | K1 | L | N | Eigenvalue problem | Eigenvalue, Eigenvector | 3 | 2 |
| 7 | Compute (*a*) the characteristic polynomial of *A*, (*b*) the eigenvalues of *A*, (*c*) a basis for each eigenspace of *A*, and (*d*) the algebraic and geometric multiplicity of each eigenvalue. | 3 | K2 | M | N | Eigenvalue problem | Eigenvalue, Eigenvector | 3 | 6 |
| 8 | Compute (*a*) the characteristic polynomial of *A*, (*b*) the eigenvalues of *A*, (*c*) a basis for each eigenspace of *A*, and (*d*) the algebraic and geometric multiplicity of each eigenvalue. | 3 | K2 | M | N | Eigenvalue problem | Eigenvalue, Eigenvector | 3 | 6 |
| 9 | Compute (*a*) the characteristic polynomial of *A*, (*b*) the eigenvalues of *A*, (*c*) a basis for each eigenspace of *A*, and (*d*) the algebraic and geometric multiplicity of each eigenvalue. | 3 | K2 | H | N | Eigenvalue problem | Eigenvalue, Eigenvector | 3 | 9/10 |
| 10 | Compute (*a*) the characteristic polynomial of *A*, (*b*) the eigenvalues of *A*, (*c*) a basis for each eigenspace of *A*, and (*d*) the algebraic and geometric multiplicity of each eigenvalue. | 3 | K2 | H | N | Eigenvalue problem | Eigenvalue, Eigenvector | 3 | 9/10 |
| 11 | Compute (*a*) the characteristic polynomial of *A*, (*b*) the eigenvalues of *A*, (*c*) a basis for each eigenspace of *A*, and (*d*) the algebraic and geometric multiplicity of each eigenvalue. | 3 | K2 | H | N | Eigenvalue problem | Eigenvalue, Eigenvector | 3 | 9/10 |
| 12 | Compute (*a*) the characteristic polynomial of *A*, (*b*) the eigenvalues of *A*, (*c*) a basis for each eigenspace of *A*, and (*d*) the algebraic and geometric multiplicity of each eigenvalue. | 3 | K2 | H | N | Eigenvalue problem | Eigenvalue, Eigenvector | 3 | 9/10 |
| 13 | Show that if a matrix has non-zero eigenvalues then it is invertible. | 3 | K3 | M | N | Eigenvalue problem | Eigenvalue, Eigenvector | 3 | 6 |
| 14 | Show that an eigenvector cannot correspond to two distinct eigenvalues. | 3 | K3 | M | N | Eigenvalue problem | Eigenvalue, Eigenvector | 3 | 6 |
| 15 | Show that the eigenvalues of a symmetric matrix are all real. | 3 | K3 | H | Y | Eigenvalue problem | Eigenvalue, Eigenvector | 3 | 6 |
| 16 | Show if the trace and determinant of a 3X3 matrix A are positive and negative respectively then matrix A has only one negative eigenvalue, considering all eigenvalues are real. | 3 | K3 | H | Y | Eigenvalue problem | Eigenvalue, Eigenvector | 3 | 6 |
| 17 | Let A be the 2x2 matrix with elements a11 = a12 = a21= + 1 and a22 = -1.Then find the eigenvalues of the matrix. | 3 | K3 | M | Y | Eigenvalue problem | Eigenvalue, Eigenvector | 3 | 6 |
| 18 | Find the eigenvalues of the matrix. | 3 | K2 | M | Y | Eigenvalue problem | Eigenvalue, Eigenvector | 3 | 2 |
| 19 | Consider the matrix. If the eigenvalues of A are 4 and 8 then find x and y. | 3 | K3 | H | Y | Eigenvalue problem | Eigenvalue, Eigenvector | 3 | 6 |
| 20 | A matrix has eigenvalues -1 and -2. The corresponding eigenvectors are  respectively. Find the matrix. | 3 | K3 | H | Y | Eigenvalue problem | Eigenvalue, Eigenvector | 3 | 6 |
| 21 | Show that the eigenvalues of a real skew-symmetric matrix are either zero or pure imaginary. | 3 | K3 | M | Y | Eigenvalue problem | Eigenvalue, Eigenvector | 3 | 6 |
| 22 | Find the minimum Eigen value of the matrix. | 3 | K3 | M | Y | Eigenvalue problem | Eigenvalue, Eigenvector | 3 | 6 |
| 23 | Find the absolute value of the ratio of the maximum eigenvalue to the minimum eigenvalue of  the matrix . | 3 | K3 | M | Y | Eigenvalue problem | Eigenvalue, Eigenvector | 3 | 6 |
| 24 | Define similar matrices. | 3 | K1 | L | N | Diagonalization | Similar Matrix | 3 | 2 |
| 25 | Show that *A* and *B* are not similar matrices. | 3 | K2 | L | N | Diagonalization | Similar Matrix | 3 | 2 |
| 26 | Show that *A* and *B* are not similar matrices. | 3 | K2 | M | N | Diagonalization | Similar Matrix | 3 | 6 |
| 27 | Determine whether *A* is diagonalizable and, if so, find an invertible matrix *P* and a diagonal matrix *D* such that. | 3 | K3 | M | N | Diagonalization | Diagonalization | 3 | 6 |
| 28 | Determine whether *A* is diagonalizable and, if so, find an invertible matrix *P* and a diagonal matrix *D* such that. | 3 | K3 | M | N | Diagonalization | Diagonalization | 3 | 6 |
| 29 | Determine whether *A* is diagonalizable and, if so, find an invertible matrix *P* and a diagonal matrix *D* such that. | 3 | K3 | H | N | Diagonalization | Diagonalization | 3 | 9/10 |
| 30 | Determine whether *A* is diagonalizable and, if so, find an invertible matrix *P* and a diagonal matrix *D* such that. | 3 | K3 | H | N | Diagonalization | Diagonalization | 3 | 9/10 |
| 31 | Determine whether *A* is diagonalizable and, if so, find an invertible matrix *P* and a diagonal matrix *D* such that. | 3 | K3 | H | N | Diagonalization | Diagonalization | 3 | 9/10 |
| 32 | Determine whether *A* is diagonalizable and, if so, find an invertible matrix *P* and a diagonal matrix *D* such that. | 3 | K3 | H | N | Diagonalization | Diagonalization | 3 | 9/10 |
| 33 | . Compute . | 3 | K3 | H | N | Diagonalization | Power Matrix | 3 | 6 |
| 34 | Compute. | 3 | K3 | H | N | Diagonalization | Power Matrix | 3 | 9/10 |
| 35 | Find all real values of *k* for which  are diagonalizable. | 3 | K3 | H | N | Diagonalization | Diagonalization | 3 | 9/10 |
| 36 | Give an example of a 3X3 matrix in support of the statement, “Eigenvectors of a symmetric matrix corresponding to different eigenvalues are orthogonal”. | 3 | K3 | H | N | Eigenvalue problem | Eigenvalue, Eigenvector | 3 | 9/10 |
| 37 | Compute  for . | 3 | K3 | H | N | Diagonalization | Diagonalization | 3 | 9/10 |
| 38 | Define real inner product space and give an example. | 3 | K1 | M | N | Inner product space | Inner product space | 3 | 2 |
| 39 | Let and be two vectors in R2. Show that defines an inner product. | 3 | K2 | M | N | Inner product space | Inner product space | 3 | 6 |
| 40 | Let and be two vectors in R2. Show that is not an inner product. | 3 | K2 | M | N | Inner product space | Inner product space | 3 | 2 |
| 41 | Define norm (Euclidean norm). | 3 | K1 | L | N | Inner product space | Inner product space | 3 | 2 |
| 42 | Define orthogonal set in . | 3 | K1 | L | N | Inner product space | Orthogonal set | 3 | 2 |
| 43 | Show that{v1,v2,v3} is an orthogonal set in R3 if v1= (2,1,-1), v2=(0,1,1), v3=(1,-1,1) | 3 | K2 | M | N | Inner product space | Orthogonal set | 3 | 2 |
| 44 | Define orthogonal basis. | 3 | K1 | L | N | Inner product space | Orthogonal  basis | 3 | 2 |
| 45 | Find an orthogonal basis for the subspace *W* of  given by | 3 | K2 | M | N | Inner product space | Orthogonal  Basis | 3 | 6 |
| 46 | Define orthonormal set in . | 3 | K1 | L | N | Inner product space | Orthogonal  Basis | 3 | 2 |
| 47 | Show that {q1, q2} is an orthonormal set in R3 if | 3 | K2 | M | N | Inner product space | Orthonormal set | 3 | 2 |
| 48 | Define orthonormal basis. | 3 | K1 | L | N | Inner product space | Orthogonal  Basis | 3 | 2 |
| 49 | Define orthogonal matrix. | 3 | K1 | L | N | Inner product space | Orthogonal  matrix | 3 | 2 |
| 50 | Determine the matrix is orthogonal. If it is, find its inverse. | 3 | K2 | M | N | Inner product space | Orthogonal  matrix | 3 | 6 |
| 51 | Determine the matrix is orthogonal. If it is, find its inverse. | 3 | K2 | M | N | Inner product space | Orthogonal  matrix | 3 | 6 |
| 52 | Define orthogonal projection. | 3 | K1 | L | N | Inner product space | Orthogonal  Projection | 3 | 2 |
| 53 | Let, where . Construct an orthogonal basis for W. | 3 | K3 | M | N | Inner product space | Orthogonal basis | 3 | 6 |
| 54 | Write the Gram-Schmidt Process. | 3 | K1 | L | N | Inner product space | Gram-Schmidt Process | 3 | 2 |
| 55 | Apply the Gram-Schmidt Process to construct an orthogonal basis for the subspace  of, where | 3 | K3 | H | N | Inner product space | Gram-Schmidt Process | 3 | 9/10 |
| 56 | Find an orthogonal basis for  that contains the vector  (by Gram-Schmidt Process) | 3 | K3 | H | N | Inner product space | Gram-Schmidt Process | 3 | 9/10 |
| 57 | If the characteristic polynomial of a square matrix *M* of order 3 over real numbers is  and one eigenvalue of *M* is 2, then find the largest among the absolute values of the eigenvalues of *M*. | 3 | K3 | H | Y | Eigenvalue | Eigenvalue | 3 | 6 |
| 58 | Let *u* and *v* be two vectors in whose Euclidean norms satisfy. What is the value of such that  bisects the angle between *u* and *v*? | 3 | K3 | H | Y | Inner product space | angle | 3 | 9/10 |
| 59 | The two eigenvalue of a real square matrix of order 3 are 3 and. Find the determinant of the matrix. | 3 | K3 | H | Y | Eigenvalue | Determinant | 3 | 6 |
| 60 | Find the determinant of if eigenvalues of *A* are 1, 2 and4. | 3 | K3 | H | Y | Eigenvalue | Determinant | 3 | 6 |
| 61 | Find the eigenvalues of a matrix whose all entries are 1. | 3 | K3 | H | Y | Eigenvalue | Eigenvalue | 3 | 6 |
| 62 | Find the values of *a* and *b* of the matrix  if the eigenvalues of the matrix are -1 and 7. | 3 | K3 | H | Y | Eigenvalue | Eigenvalue | 3 | 6 |