**H.T No**

**Regulations:**

**A20**



**Sreenidhi Institute of Science and Technology**

(An Autonomous Institution)

**Code No: 8HC10**  **Date: 28-July-2021(AN)**

**B.Tech I-Year I- Semester Covid-19 Special External Examination, July-2021 (Regular)**

**LINEAR ALGEBRA AND CALCULUS (CSE, IT and ECM)**

**Time: 3 Hours Max.Marks:70**

***Note: a****) No additional answer sheets will be provided.*

*b) All sub-parts of a question must be answered at one place only, otherwise it will not be valued.*

*c) Missing data can be assumed suitably.*

**ANSWER ANY 5 OUT OF 8 QUESTIONS. EACH QUESTION CARRIES 14 MARKS.**

**Bloom's Cognitive Levels of Learning (BCLL)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Remember | L1 | Apply | L3 | Evaluate | L5 |
| Understand | L2 | Analyze | L4 | Create | L6 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  | **BCLL** | **CO(s)** | **Marks** |
| 1. | a) | Reduce the matrix  into echelon form and hence find its rank. | L4 | CO1 | [7M] |
|  | b) | Find  and  such that the equations x+y+z=6, x+2y+3z=10, x+2y+=  have (i) no solution (ii) Unique solution (iii) Many solutions . | L5 | CO1 | [7M] |
|  |  |  |  |  |  |
| 2. |  | Determine the Eigen values and Eigen vectors of the matrix  *A =* | L5 | CO2 | [14M] |
|  |  |  |  |  |  |
| 3. | a) | Show that the three vectors (1,2,-2), (2,-3,4) and (1,3,-2) are linearly independent. | L3 | CO3 | [7M] |
|  | b) | If a map T: V2( R)→ V3( R) defined by  T(p,q)= (p+q, p-q, q) is a linear transformation. Find the range, rank, null space and nullity of T. | L4 | CO3 | [7M] |
|  |  |  |  |  |  |
| 4. |  | Use Gram-Schmidt orthogonalization process to the vectors β1= (1,0,1), β2= (1,0,-1) and β3= (0,3,4) to determine the orthonormal basis (α1, α2, α3) for R3 with standard inner product. | L4 | CO4 | [14M] |
|  |  |  |  |  |  |
| 5. | a) | Calculate the approximate value of by using Lagrange’s mean value theorem. | L5 | CO5 | [7M] |
|  | b) | Verify Cauchy’s mean value theorem for f(x)=ex and g(x)=e-x on [a,b]. | L3 | CO5 | [7M] |
|  |  |  |  |  |  |
| 6. | a) | Show that β (m,n) = . | L4 | CO6 | [7M] |
|  | b) | Find the Evolute of the curve given by  x = 2cost + cos2t and y = 2sint – sin2t . | L5 | CO6 | [7M] |
|  |  |  |  |  |  |
| 7. | a) | Show that the matrix A =  is a nilpotent of order 2. | L4 | CO1 | [5M] |
|  | b) | What is the sum of the Eigen values of A = | L2 | CO2 | [5M] |
|  | c) | Let T be a linear operator on R2 defined by  T(x,y)= (4y,6x+y). Find the matrix representation of T relative to the basis {(1,4), (2,6)}. | L5 | CO3 | [4M] |
|  |  |  |  |  |  |
| 8. | a) | Let W be a subspace of the inner product space V spanned by {(2,1,1,2), (2,5,-3,-2), (3,4,-5,-4). Find orthonormal basis for W. | L5 | CO4 | [5M] |
|  | b) | Prove that between any two roots of there exists at least one root of | L3 | CO5 | [5M] |
|  | c) | Find the volume generated by revolving the ellipse  about X-axis. | L5 | CO6 | [4M] |

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