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**PRESIDENCY UNIVERSITY**

**Bengaluru**

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| **Ph.D. Course Work End Term Examinations – JAN-FEB 2025** |
| **Date:** 31- 01- 2025 **Time:** 09:30 am – 12:30 pm |

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| **School:** SOE | **Program:** Ph.D. | |
| **Course Code :**MAT847 | **Course Name :** Numerical Linear Algebra | |
| **Semester**: | **Max Marks**:100 | **Weightage**: 50% |

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| **CO – Levels** | **CO1** | **CO2** | **CO3** | **CO4** | **CO5** |
| **Marks** | **50** | **-** | **50** | **-** | **-** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Do not write anything on the question paper other than roll number.*

**Part A**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Answer ALL the Questions. Each question carries 10 marks. 6Q x 10M=60Marks** | | | | |
| **1** | Define linearly independent and linearly dependent. Check whether or not the following vectors are linearly independent of 𝑅3:   1. (1, −2,1), (2,1, −1), (7, −4,1) 2. (2,3,5), (4,9,25) | **10 Marks** | **L** | **CO1** |
| **2** | Prove that every finite dimensional inner product space has an orthonormal basis. | **10 Marks** | **L** | **CO1** |
| **3** | Define the Jordan matrix, Defective matrix, Non defective matrix and Positive definite matrix. | **10 Marks** | **L** | **CO1** |
| **4** | 1. Define Vector norm and give one example? 2. Define Matrix norm and give one example? 3. Define convergence of a vector norm ? 4. Define convergent matrices? | **10 Marks** | **L** | **CO3** |
| **5** | 1. Define singular value of an matrix? 2. Find the singular values of   A = | **10 Marks** | **L** | **CO3** |
| **6** | 1. Define SVD? 2. Write the State of minimax theorem and perturbation theorem for singular values? | **10 Marks** | **L** | **CO3** |

**Part B**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Answer the Questions. Each question carries 20 marks 2Q x 20 = 40 Marks** | | | | | |
| **7.** |  | State and prove Cauchy schwarz inequality | **20 Marks** | **L** | **CO1** |
|  | | | | | |
| **8.** |  | 1. Define subordinate matrix norm. 2. Calculate 1-norm and infinity-norm of   B =   1. Calculate Euclidean norm of | **20 Marks** | **L** | **CO3** |

**\*\*\*\*\* BEST WISHES \*\*\*\*\***