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**PRESIDENCY UNIVERSITY**

**Bengaluru**

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| **End - Term Examinations – JANUARY 2025** |
| **Date:** 13 – 01- 2025 **Time:** 01:00 pm – 04:00 pm |

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| --- | --- | --- |
| **School:** SOE/SOCSE | **Program:** B.Tech-First Year Physics Cycle | |
| **Course Code :** MAT1001 | **Course Name :** CALCULUS AND LINEAR ALGEBRA | |
| **Semester**: I | **Max Marks**: 100 | **Weightage**: 50 % |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CO - Levels** | **CO1** | **CO2** | **CO3** | **CO4** |
| **Marks** | **28** | **54** | **44** | **54** |

**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 2marks. 10Q x 2M=20M** | | | | |
| **1** | Find the rank of the matrix . | **2 Marks** | **L1** | **CO1** |
| **2** | For a  matrix , if one of the eigenvalue is  and , find all the eigenvalues of matrix . | **2 Marks** | **L1** | **CO1** |
| **3** | For a  matrix , if t,  and one eigenvalue is , find the remaining eigenvalues. | **2 Marks** | **L1** | **CO1** |
| **4** | State any two uses of Cayley-Hamilton theorem. | **2 Marks** | **L1** | **CO1** |
| **5** | If , find . | **2 Marks** | **L1** | **CO2** |
| **6** | Define Jacobian of  . | **2 Marks** | **L1** | **CO2** |
| **7** | Find the value of. | **2 Marks** | **L1** | **CO3** |
| **8** | Find. | **2 Marks** | **L1** | **CO3** |
| **9** | Discuss the complementary solution for a 2nd order ordinary differential equation with roots of auxiliary equations as. | **2 Marks** | **L1** | **CO4** |
| **10** | Find the solution of. | **2 Marks** | **L1** | **CO4** |

**Part B**

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| **Answer the Questions Total 80 Marks** | | | | | |
| **11.** | Solve the following system of equations using Gauss-elimination method:  . | | **10 Marks** | **L2** | **CO1** |
| **Or** | | | | | |
| **12.** | Find all the eigenvalues and corresponding eigenvectors of . | | **10 Marks** | **L2** | **CO1** |
|  |  |  |  |  |  |
| **13.** | If , prove that . | | **10 Marks** | **L2** | **CO2** |
| **Or** | | | | | |
| **14.** | If , show that . | | **10 Marks** | **L2** | **CO2** |

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| **15.** | Evaluate . | **10 Marks** | **L2** | **CO3** |
| **Or** | | | | |
| **16.** | Show that | **10 Marks** | **L2** | **CO3** |

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| **17.** | Evaluate , where  is the region bounded by the co-ordinate axes and the line . | **10 Marks** | **L3** | **CO3** |
| **Or** | | | | |
| **18.** | Evaluate . | **10 Marks** | **L3** | **CO3** |

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| **19.** | Find the complementary function for the following: | | **10 Marks** | **L2** | **CO4** |
| **a.** | . |
| **b.** | . |
| **Or** | | | | | |
| **20.** | Solve . | | **10 Marks** | **L2** | **CO4** |

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| **21.** | Express  in power of  and  using Taylor’s series up to third degree. | **15 Marks** | **L3** | **CO2** |
| **Or** | | | | |
| **22.** | Find the extreme values in . | **15 Marks** | **L3** | **CO2** |

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| **23.** | Solve . | **15 Marks** | **L3** | **CO4** |
| **Or** | | | | |
| **24.** | Solve . | **15 Marks** | **L3** | **CO4** |

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