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**PRESIDENCY UNIVERSITY**

**Bengaluru**

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| **Ph.D. Course Work End Term Examinations – JAN-FEB 2025** |
| **Date:** 03 – 02- 2025 **Time:** 09:30 am – 12:30 pm |

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| **School:** SOE | **Program:** Ph.D. | |
| **Course Code :** MAT846 | **Course Name :** Impulsive systems with time delays | |
| **Semester**: | **Max Marks**:100 | **Weightage**:50% |

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| --- | --- | --- | --- | --- | --- |
| **CO – Levels** | **CO1** | **CO2** | **CO3** | **CO4** | **CO5** |
| **Marks** | **40** | **20** | **20** | **10** | **10** |

**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** | Explain difference between the Lyapunov-Razumukhin approach and Lyapunov-Krasovskii's approach. | **10 Marks** | **L** | **CO2** |
| **2** | Write the statement of the Gronwall-Type Inequalities and Halanay Inequality. Then explain the difference between Gronwall-Type Inequalities and Halanay Inequality. | **10 Marks** | **L** | **CO4** |
| **3** | Explain finite time stability with and without impulse | **10 Marks** | **L** | **CO2** |
| **4** | Write brief notes on the Hybrid delayed impulse systems | **10 Marks** | **L** | **CO3** |
| **5** | Explain impulses with stabilizing delay and Destabilizing Delays | **10 Marks** | **L** | **CO3** |
| **6** | Explain dynamical neural network adaptation method | **10 Marks** | **L** | **CO5** |

**Part B**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Answer the Questions. Each question carries 20 marks 2Q x 20 = 40 Marks** | | | | | |
| **7.** |  | Write brief notes on the classification of impulsive systems. | **20 Marks** | **L** | **CO1** |
|  | | | | | |
| **8.** |  | Prove that the existence and uniqueness solution of impulsive differential equations. | **20 Marks** | **L** | **CO1** |

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