

JSPM's  
Rajarshi Shahu College of Engineering, Pune  
Department of Electronics & Telecommunication  
Engineering

---

**INNOVATIONS IN TEACHING AND  
LEARNING**

**Course: Control Systems**

**Class: T.Y. BTech E&TC A.Y.2025-26 SEM I**

**Topic: Time Response of Control Systems**

**NAME OF THE ACTIVITY:** Demonstration using Analog Stopwatch

Class: TY Btech ; Div –A, Date : 1<sup>st</sup> August 2025; Time: 10.00 AM

**I. Concept**

Analog Stopwatch was employed in class to **teach transient and steady-state responses** of control systems. The physical stopwatch provides a real-time visual aid to understand time-domain behavior, making abstract mathematical concepts more tangible for students.

**Core Topic:** Time Response of First and Second Order Systems – Transient response (rise time, peak time, settling time) vs. Steady-state response.

**II. Objective (Goal)**

1. **Cognitive:** Enable students to connect theoretical definitions (rise time, delay time, settling time) with real-time measurement.
2. **Skill-Based:** Develop ability to measure and interpret system response parameters using stopwatch observations.
3. **Engagement:** Foster active learning through live demonstrations and student participation in time measurement tasks.

### III. Appropriateness (Relevance of Selected Method)

#### Pedagogical Justification:

1. **Experiential Learning Theory:**

- Stopwatch demonstration gives students a hands-on experience of measuring time response → strengthens conceptual clarity.

2. **Bloom's Taxonomy Alignment:**

- Demonstration: *Understanding/Applying* (students observe stopwatch behavior and relate it to system response).
- In-class activity: *Analyzing/Evaluating* (students compare transient vs. steady-state values across systems).

#### Technical Relevance:

- Control system concepts like **time constant, rise time, and steady-state error** are abstract and often misunderstood.
- Analog stopwatch helps visualize and measure these parameters in real-time demonstrations.

### IV. Effective Presentation (Implementation Details)

#### In-Class Phase

- **Resource:** Mechanical/Analog Stopwatch.
- **Activity :** Demonstration of stopwatch hand movement → explained as an analogy of a system response curve (movement from zero to stable value).

### V. Results (Impact)

- Student feedback: *"The stopwatch analogy made abstract terms of time response easier to visualize."*

### VI. Reproducibility and Reusability by Other Scholars for Further Development

Sr.No	Innovation Used by	Details of User	Purpose of Reproducibility and Reusability
1	Dr.S.M.Joshi	Faculty of another division	Stopwatch demonstration reusable as a simple, low-cost teaching aid; adaptable for other time-domain topics in control systems.



## VII. PEER REVIEW AND CRITIQUE

Category: Internal/External/Interdepartmental

Score: (1:Least – 2: Moderate – 3: Highly)

- Q1. Is this Innovative Teaching and Learning Methodology useful during content delivery?
- Q2. Did this innovation increase student motivation or participation?
- Q3. Will it show improvement in student learning?
- Q4. Suggestions for improvement in future iterations.



Demonstration in Class

*Dr. S.D. Kale*  
Dr.S.D.Kale  
Course Co-ordinator

*Dr. S.A. Paithane*  
Dr. S.A.Paithane  
Module Co-ordinator

*Dr. S.C. Wagaj*  
Dr.S.C.Wagaj  
HOD E&TC

**HEAD OF DEPARTMENT**  
**Electronics & Tele Communication**  
JSPM's Rajarshi Shahu College of Engineering  
(An Autonomous Institute)  
Tathawade, Pune - 411 033, M.S. (India)