Department of Electronics and Communication Engineering
Academic Year 2024-2025 (Odd Semester)
Planning Document

Degree, Semester& Branch: III Semester B.E.ECE B
Course Code & Title: EC3351 & Control Systems
Name of the Faculty member: Mr.R.Ramasamy

- **Unit/Topic: Unit-IV /** Problems in Root Locus
- **Course Outcome:** CO4
- **Topic Learning Outcome:** TLO 14
- **Activity Chosen:** Jigsaw

Learning Outcomes:
The Student will be able to

- ❖ Understand the concept of Control System Basics
- ❖ Plot the root locus on the complex plane.
- ❖ To solve problems related to stability and control using root locus techniques.
- ❖ Participate actively in the learning process
- ❖ Discuss the concepts, convey idea and share the views of locate poles and zeros, to find root locus on real axis, to find angle asymptotes and centroid, find breakaway and break-in points, to find angle of departure, find the crossing point on imaginary axis.
- ❖ Communicate effectively by sharing their views among the teammates

Justification:

- The root locus method is widely used in control system engineering for its ability to visually represent a system's dynamic behaviour. It illustrates how closed-loop poles move across the complex plane as a key parameter, typically the controller gain, changes. This graphical approach gives engineers an intuitive understanding of system stability, assisting in both the design and analysis of control systems. It is an effective tool for controller design, allowing for parameter adjustments to achieve desired closed-loop characteristics. Additionally, the method's educational value enhances understanding of system dynamics and stability, making it a powerful teaching aid. Moreover, the root locus method provides insights into trade-offs between performance metrics, enabling engineers to make informed design decisions.

Time Allotted for the Activity: 50 Minutes

- **Details of the Implementation:**

(i) Materials for the Activity:

The materials for the preparation of the students will be shared one week before through LMS Canvas. Including the material, students were asked to refer to the web content also.

References:

Book Title/ Author/ Publisher/ Edition	**Page No.**
1. 1. M.Gopal, “Control System – Principles and Design”, Tata McGraw Hill, 4th Edition, 2012.	404-443

Websites
1. https://archive.nptel.ac.in/courses/107/106/107106081/ 2. https://archive.nptel.ac.in/courses/107/106/107106081/ 3. https://archive.nptel.ac.in/courses/107/106/107106081/ 4. https://archive.nptel.ac.in/courses/107/106/107106081/

(ii) Formation of Groups:

Student groups were created as below:

- Class Strength: 63
- Number of groups: 10
- Members per group: 04(7) + 05(6) + 01(5)

- **Plan for Implementing this Activity:**
  - 8 groups are formed with 4 or 5 members
  - Each group is allotted with a name and its known as Home group.
  - Each expert group is allotted with one topic
    - **To locate poles and zeros. Find Root Locus Real Axis**
    - **Find angle of asymptotes and centroid**
    - **Find breakaway and break-in points**
    - **Find angle of departure and angle of arrival**
    - **Find the crossing points on imaginary axis.**
  - The expert group members discuss the topic in detail for 20 minutes with the learning materials already posted in the course website – canvas.
  - The Expert group members should go to their original shape group and discuss the points (30 Minutes) to the other members.
  - All the members in home group learnt about all the topics through expert group members.
  - Finally one from each group should summarize the points of the topic Fixed and Floating point representation to the class (20 Minutes).
  - Review of points and conclusion of the activity (5 minutes)
  - Thus the concept of Root Locus is known to all by involving the students actively

Expected Difficulties:

- Lack of preparation: Making the students to learn the materials is the challenging task.
- Each student has to read the material posted in the course website.
- Non participation in the activity: All the students should be made involve in the activity
- Time management: The Jigsaw activity should be able to complete in the planned duration.

Plan for preventing these difficulties:

- Making each student accountable by making formative and summative assessment for individual and group performance.
- Including the assessment mark for final internal mark calculation makes each student to participate actively in the Jigsaw activity.
- Each student contribution mark in the assessment will be based on the discussions in the course website and WhatsApp group through which all the students will participate in the activity.
- Posting announcements periodically for learning and preparing the presentation.
- The Time management will be avoided by using timer clock for 10 minutes duration.

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Active Learning Practices

Degree, Semester& Branch: III Semester B.E.ECE B
Course Code & Title: EC3351 & Control Systems
Name of the Faculty member: Mr.R.Ramasamy

Active Learning Practices Execution	
UNIT IV CONCEPTS OF STABILITY ANALYSIS	
Activity: Jigsaw **Topic:** Problems in ROOT LOCUS	
	

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Active Learning Practices

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Course Code & Title: EC3351 & Control Systems
Name of the Faculty member: Mr.R.Ramasamy

Active Learning Practices Execution	
UNIT IV CONCEPTS OF STABILITY ANALYSIS	
Activity: Zero Minute Speech **Topic:** Introduction to Routh stability criterion