



SNS COLLEGE OF TECHNOLOGY



(An Autonomous Institution)

COIMBATORE-35

Accredited by NBA-AICTE and Accredited by NAAC – UGC with A++ Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

UNIT V: MONITORING AND CONTROL

TOPIC: PREVENTIVE CONTROL & EMERGENCY CONTROL





TOPIC OUTLINE

- INTRODUCTION
- PREVENTIVE CONTROL
- PREVENTIVE CONTROL MEASURES
- EMERGENCY CONTROL
- STRATEGIES OF EMERGENCY CONTROL
- FUTURE TRENDS AND CHALLENGES



Overview Of Power System Operation



A power system comprises various essential components, including generation, transmission, distribution, transformers, switchgear, protection devices, control centers, and SCADA systems. The control and stability of power systems are paramount for ensuring reliable and safe electricity supply. Control mechanisms maintain system reliability, efficiency, and safety, while stability mechanisms prevent system-wide disturbances and blackouts. Understanding the basic components and their roles is essential for efficient operation and management of power systems.



Preventive Control :

- Preventive control in power systems involves measures taken to anticipate and mitigate potential issues before they escalate into problems or failures
- Preventive control is used proactively to maintain the reliability, stability, and efficiency of power systems, reducing the risk of outages or disturbances. It helps utilities and operators to identify vulnerabilities and address them before they impact the system's operation





Preventive Control Measures :

- Routine Maintenance: Regular inspections & servicing of equipment.
- Condition Monitoring: Continuous assessment using various techniques.
- Predictive Analytics: Forecasting failures based on data analysis.
- Asset Management: Optimizing lifecycle performance of equipment.
- Voltage/Frequency Regulation: Maintaining system stability.
- Cybersecurity Measures: Protecting infrastructure from cyber threats.



Emergency Control :

- Emergency control in power systems refers to the actions taken during unexpected or critical situations to maintain the stability.
- Emergency control is deployed in situations such as sudden load imbalances, equipment failures, extreme weather events, or other unforeseen circumstances that threaten the normal operation of the power system.
- Its primary goal is to restore the system to a stable state as quickly as possible and minimize the impact on customers and infrastructure





Strategies Of Emergency Control:

- Load Shedding: Prioritize critical loads to balance supply and demand.
- Generation Redispatch: Quickly adjust generator output to maintain stability.
- Backup Power Systems: Activate emergency generators or storage.
- Isolation and Protection: Prevent spread of disturbances by isolating faulty equipment.
- Black Start Procedures: Systematic restoration after a complete blackout.



Future Trends And Challenges:

Trends:

- Smart Grid Technologies: IoT and automation for enhanced control.
- Decentralized Energy Resources: Integration of renewables and microgrids for flexibility.

Challenges:

- Interoperability Issues: Ensuring seamless system integration.
- Data Privacy Concerns: Addressing privacy issues with operational data.



RECAP....



...THANK YOU