OBJECTIVES

• To learn the design and control principles of Wind turbine.

• To understand the concepts of fixed speed and variable speed, wind energy conversion systems.

• To analyze the grid integration issues.

UNIT I      INTRODUCTION

Components of WECS-WECS schemes-Power obtained from wind-simple momentum theory- Power coefficient-Sabinin’s theory-Aerodynamics of Wind turbine

UNIT II      WIND TURBINES

HAWT-VAWT-Power developed-Thrust-Efficiency-Rotor selection-Rotor design considerations- Tip speed ratio-No. of Blades-Blade profile-Power Regulation-yaw control-Pitch angle control- stall control-Schemes for maximum power extraction.

UNIT III     FIXED SPEED SYSTEMS

Generating Systems- Constant speed constant frequency systems -Choice of Generators- Deciding factors-Synchronous Generator-Squirrel Cage Induction Generator- Model of Wind Speed- Model wind turbine rotor - Drive Train model-Generator model for Steady state and Transient stability analysis.

UNIT IV      VARIABLE SPEED SYSTEMS

Need of variable speed systems-Power-wind speed characteristics-Variable speed constant frequency systems synchronous generator- DFIG- PMSG -Variable speed generators modeling- Variable speed variable frequency schemes.

UNIT V      GRID CONNECTED SYSTEMS

Wind interconnection requirements, low-voltage ride through (LVRT), ramp rate limitations, and supply of ancillary services for frequency and voltage control, current practices and industry trends wind interconnection impact on steady-state and dynamic performance of the power system including modeling issue.

TOTAL: 45 PERIODS
REFERENCES


