

**Project 1: Validation of any rooftop solar PV system in campus**

- 1- Collect the data of all installed rooftop solar PV systems inside the campus
- 2- Develop and simulate any one rooftop solar PV system and validate the results
- 3- Justify the variations in the observed results if any

**Project 2: Smart meters**

- 1- Implement a circuit to measure the active power, power factor and the energy consumed from a specific load.
- 2- Develop your circuit to give an alarm when the power consumption exceed specific threshold at peak load time and/or when power factor falls below a certain limit.

**Project 3: Electric energy efficiency in DESE building**

- 1- Collect the data of electrical loads, sources and energy consumption of DESE building.
- 2- Suggest an energy efficient solution that decreases the power consumption in the building with same or better performance.
- 3- Estimate the cost of your suggested solution, the saved energy and the payback period.

**Project 4: Transient stability of standard system**

- 1- Study and simulate standard IEEE 14 bus system
- 2- Study the transient stability behaviour of the system for various faults and clearance time.
- 3- Also study the impact of fault location on the system stability behaviour, for a particular fault

**Project 5: Unit commitment program with wind energy penetration**

- 1- Study the unit commitment problem in power system.
- 2- Write a program to find the optimum unit commitment in any given power system.
- 3- Develop a GUI for your program.

**Project 6: Study power generation in India**

- 1- Collect the data of all installed generation (capacity, type of power plant, generation voltage, generator transformer rating, and lifetime, etc.) in India in all the five regional grids.
- 2- Collect data for all renewable energy generation installed and to be installed by the year 2022 (type of power plant, location, installed capacity, estimated year of installation, voltage level of substation to which it is connected etc.)
- 3- Collect the data of India's 100 GW solar PV plan for 2022

**Project 7: Design a rooftop solar PV system with battery**

- 1- Design a rooftop solar PV system for DESE building (net energy=0)
- 2- Size an appropriate battery system for the designed rooftop PV (off-grid system)

**Project 8: Frequency stability with increase in solar PV penetration**

- 1- Study and simulate standard IEEE 14 bus system with different solar PV penetration level
- 2- Study the impact of decreased system inertia on system frequency response
- 3- Observe the frequency stability behaviour of the system for various faults

**Project 9: Load type estimation**

- 1- Study about various methods of load type estimation
- 2- Choose any one substation in the IITB campus and estimate its load type

**Project 10: Power system stability**

- 1- Study about the various types of power system stability issues (Classification of Power system stability)
- 2- With the help of proper test systems, simulate cases for voltage stability issues and analyse the results

**Project 11: Reactive power compensation in power system**

- 1- Study about the concept of reactive power compensation and various methods of reactive power compensation
- 2- Choose proper study system and Simulate case studies of any two reactive power compensation methods and analyse the results

**Project 12: Load Flow Analysis**

- 1- Study various load flow analysis methods used in power systems
- 2- Study the load flow of IEEE 14 bus system using Gauss-Seidel method, N-R method, Decoupled method, Fast Decoupled method and DC load flow method
- 3- Make a comparison of these load flow methods based on the results

**Project 13: Solar-Wind Hybrid system**

- 1- Collect the data of all Solar PV-Wind Hybrid systems installations in India
- 2- Model any existing hybrid system in MATLAB with actual parameters and carry out steady state and transient analysis

**Project 14: AVR and PSS for synchronous generator**

- 1- Study the effective role of AVR and Power System Stabiliser (PSS) in power systems
- 2- Develop a detailed model of synchronous generator, AVR and PSS in MATLAB
- 3- Study the test system behaviour with and without PSS and analyse the results

**Project 15: MPPT techniques for solar plants**

- 1- Conduct a detailed study of various MPPT methods used for solar PV plants
- 2- Prepare a chart showing the comparison of these methods in terms of different parameters (accuracy, complexity, speed etc)
- 3- Implement all MPPT methods and make a comparison of the results

**Project 16: Frequency control of power systems**

- 1- Discuss frequency control in power system
- 2- Study and implement primary frequency control (droop control) and secondary frequency control in IEEE 9 bus system

**Project 17: Implementation of type 1 / Type 2 WTG**

- 1- Implement detailed type1 / Type 2 WTG models in MATLAB Simulink
- 2- Modify the standard IEEE 9 bus system by replacing a synchronous generator with the WTG and study the changes in system behaviour
- 3- Carry out the case studies of high wind and low wind conditions with and without reactive power compensation

**Project 18: Offshore Wind Energy Systems**

- 1- Identify all the potential sites for offshore wind energy systems in India
- 2- Choose the location with highest possible potential and design an offshore wind farm (number of turbines, area of farm, rating of components, modelling of cables/ transmission lines etc)

**Project 19: Optimisation of charging profile of E-Shuttle in IITB campus**

- 1- Collect the data of IITB campus distribution system
- 2- Simulate the distribution system and calculate the approximate distribution losses and voltage drop.
- 3- Identify the load curve and determine optimised charging profile of E-Shuttle
- 4- Do the same considering an increase in number of E-Shuttles in future (can consider increase in charging points also)

**Project 20: Street lighting system of IITB campus**

- 1- Collect complete street lighting data of the campus
- 2- Identify limitations in the existing street lighting system of the campus
- 3- Model and simulate the campus street lighting system in a software platform, with each lighting type modelled separately
- 4- Suggest clean and cheap alternative of the existing street lighting system

**Project 21: Modelling of Western Electricity Coordinating Council (WECC) composite load model**

- 1- Study WECC composite load model (Basic study material will be provided)
- 2- Model and simulate a WECC composite load model
- 3- Validate the WECC composite load model