



POWER ENGINEERING

(Power Systems)

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POWER ENGINEERING

- ✓ What is power engineering?
- ✓ What are the focused area of power engineering?
- ✓ What are the challenges and issues?
- ✓ Role and requirements of power engineers?
- ✓ Advancements in the area of power engineering?
- ✓ What are the core courses required to understand?
- ✓ Which kind of skills are required to work as power engineers?
- ✓ What is the job prospects?
- ✓ Need of advance research in power engineering?



POWER ENGINEERING

- ✓ What is power engineering?

Historical Background:

- ✓ In the late 17th century, electricity became a subject of scientific interest with the work of William Gilbert.
- ✓ A number of important discoveries, including the incandescent light bulb and the voltaic pile were made over the next two centuries.
- ✓ Most importantly, the greatest discovery in the field of Power Engineering can be traced back to times of Michael Faraday.
- ✓ According to Michael Faraday, a change in magnetic flux induces an electromotive force in a loop of wire. This principle is known as electromagnetic induction. It helps to explain how generators and transformers work.



POWER ENGINEERING

- ✓ What is power engineering?
- ✓ Since then, power has been proved as lifeblood of any organization.
- ✓ Power is not only required for keeping the lights on but also required for all mechanical, electrical and electronic operations.
- ✓ For effective and efficient generation, delivery, and utilization of electric power, energy remains one of the most challenging and exhilarating fields of electrical engineering.

POWER ENGINEERING

- ✓ What are the focused area of power engineering?
- ✓ Power Engineering focuses on network of interconnected components for conversion of different forms of energy to electrical energy.
- ✓ Power Engineering has been divided into four main subsystems, including:
 - Generation subsystem
 - Transmission subsystem
 - Distribution subsystem
 - Utilization subsystem



POWER ENGINEERING

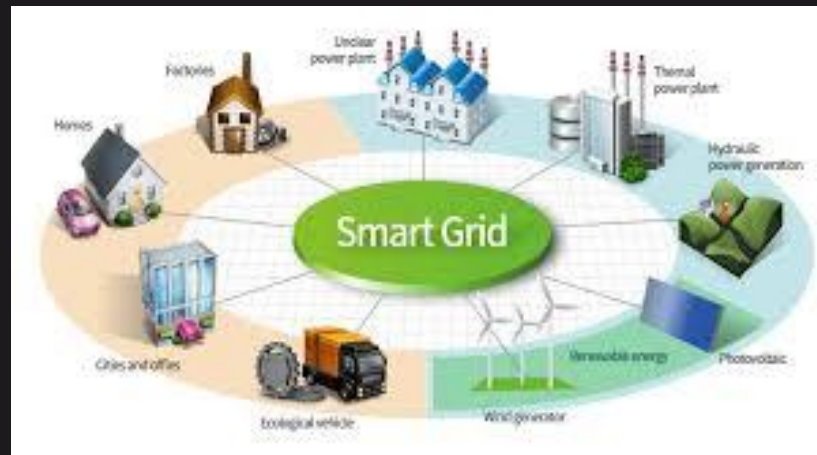
- ✓ What are the challenges and issues?
- ✓ Global issues like climate change, scarcity of water and energy have compelled the individuals to take the last resort of electrical energy generated with sustainable technologies.
- ✓ Role and requirements of power engineers?
- ✓ Certified power engineers are highly required for operational management, maintenance, renovation, and repair of boiler systems and other mechanical systems.



POWER ENGINEERING

- ✓ Advancements in the area of power engineering?
- ✓ Integration of the concept of “Smart Grid” has added numbers of new advancements in the area of power engineering applications such as intelligent power system, optimum efficiency, reliability, security and stability in generation planning, transmission and distribution.

- F.C. Kohli, founder, Tata Consultancy Service





POWER ENGINEERING

- ✓ What are the core courses required to understand?

Core Subjects

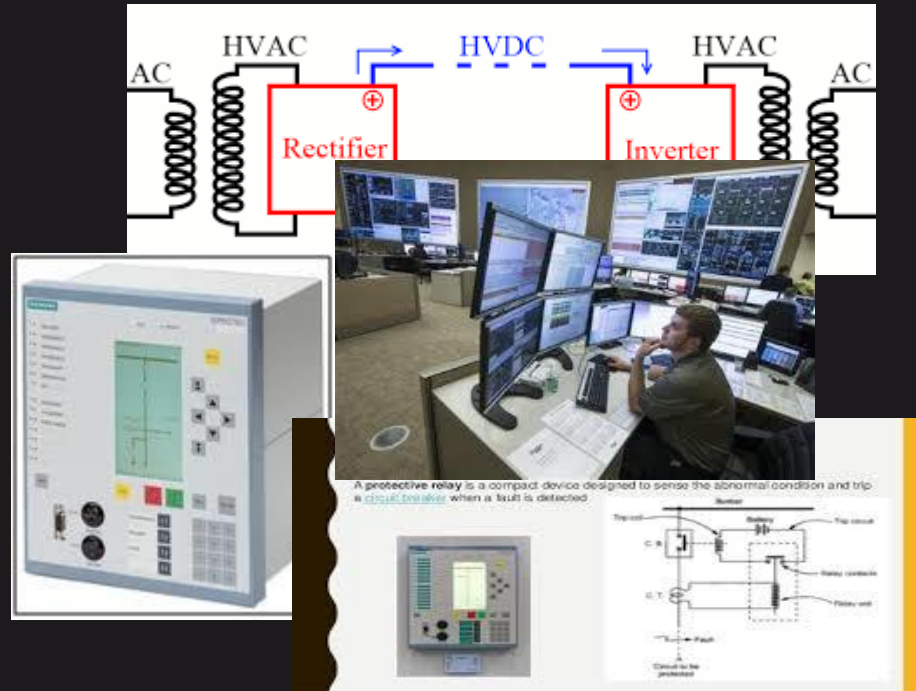
- ✓ Fluid machinery
- ✓ Engineering thermodynamics
- ✓ Materials science and technology
- ✓ Renewable energy systems
- ✓ Hydro power generation
- ✓ Theory of machines
- ✓ Nuclear power generation
- ✓ Digital electronics & integrated circuits
- ✓ Heat transfer
- ✓ Electrical machines
- ✓ Microprocessor and microcontroller
- ✓ Generators and its auxiliaries
- ✓ Electrical equipment in power station
- ✓ Transmission and distribution
- ✓ Control system
- ✓ Advance power generation technology
- ✓ Protections & instrumentation
- ✓ Internal combustion engines
- ✓ Power system operation
- ✓ Thermal power plant operation & Maintenance
- ✓ Operations research and industrial Engineering

POWER ENGINEERING

- ✓ Which kind of skills are required to work as power engineers?

Personal skills required for job opportunity

- ✓ Problem solving skills
- ✓ Monitoring skills
- ✓ Troubleshooting skills
- ✓ Attention to detail
- ✓ Analytical skills





POWER ENGINEERING

✓ What is the job prospects?

- ❑ Job prospects for Power engineers are growing tremendously. As an emerging economy, India's power sector is gaining momentum. In terms of electricity generation, India is the 5th largest producer of electricity in the world. For India's economic growth and development, electricity will continue to remain a key input. By 2016-17, the demand for electricity is likely to reach 155 GW.
- ❑ For effective solutions, the sector needs professionals from various subjects of study, including Engineering, Finance, Commerce, Logistics, Human Resource and Law. Most of the public sector companies, including National Thermal Power Corporation, Power Finance Corporation and Power Grid Corporation of India Limited etc. require professionals with Power Engineering skills.



POWER ENGINEERING

- ✓ Need advance research?
- ✓ The Power Systems with Advanced Research provide the ability to critically evaluate methodologies, analytical procedures and advanced research methods.
- ✓ The main focus is to understand following:
 - ✓ Control concepts and methods
 - ✓ Advanced energy conversion systems and power electronic applications
 - ✓ Advanced power electronic technologies for electrical power networks – HVDC and FACTS
 - ✓ Electrical power system engineering - using state-of-the-art computational tools and methods, and design of sustainable electrical power systems and networks
 - ✓ Economic analysis of electrical power systems and electricity markets.



POWER ENGINEERING

✓ Need of advance research?

Employability

The expertize in the field of power engineering meets the industrial demand for the training and education of both existing and future engineers in the advanced concepts of electrical power systems and renewable energy.

The aims is to provide the highest caliber who will be much in demand due to their skills, knowledge and ability to lead in teams involved in the operation, control, design, and economic analysis of the electrical power systems and networks of the future – smart grids.

Power Engineering Technologies

- ✓ **Conventional Power Systems Technologies**

Fundamentals of system components and operations

- ✓ **Advanced Power Systems Technologies**

Application of computer based operations and analysis

- ✓ **Power Electronics based Technologies**

*Power quality and reliability related issues and remedial actions.
Integration of renewable energy and ICT based technologies*

- ✓ **Power Management and Decision Making**

Power market operations and policies

POWER ENGINEERING

- ✓ What is renewable energy system and role of power engineers?
- ✓ What do you mean by renewable energy integration?
- ✓ Why modelling and simulation is required in the area of power engineering applications?
- ✓ Role of modelling and simulation in Renewable Energy Systems and Integration?



Thank you

**The best way to predict the
future is to create it.**

Peter Drucker