COLLEGE OF ENGINEERING AND TECHNOLOGIES
ALMUSTAQBAL UNIVERSITY

Power Engineering

EET 305

Lecture 4

- Generating Stations I -

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Introduction to Generating Stations

- Bulk electric power is produced by special plants known as generating stations or power plants.

- The prime mover (e.g., steam turbine, water turbine etc.) converts energy from some other form into mechanical energy.

Introduction to Generating Stations

- The alternator converts mechanical energy of the prime mover into electrical energy.

- The electrical energy produced by the generating station is transmitted and distributed with the help of conductors to various consumers.

Steam Power Station (Thermal Station)

- A generating station which converts heat energy of coal combustion into electrical energy is known as a steam power station.
- A steam power station basically works on the Rankine cycle.
- Steam is produced in the boiler by utilizing the heat of coal combustion.

- The steam is then expanded in the prime mover (i.e., steam turbine) and is condensed in a condenser to be fed into the boiler again.
- The steam turbine drives the alternator which converts mechanical energy of the turbine into electrical energy.
- This type of power station is suitable where coal and water are available.

Advantages

- Fuel (i.e., coal) used is cheap.
- Less initial cost as compared to other generating stations.
- Coal can be transported to the site of the plant by rail or road.
- It requires less space as compared to the hydroelectric power station.
- Cost of generation is lesser than that of the diesel power station.

Disadvantages

- It pollutes the atmosphere due to the production of large amount of smoke and fumes.

- Its running cost is high as compared to hydroelectric plant.

Choice of Site for Steam Power Stations:

- Supply of fuel.
- Availability of water.
- Transportation facilities.
- Cost and type of land.
- Nearness to load centers.
- Distance from populated area.

Hydro-electric Power Station

- A generating station which utilizes the potential energy of water at a high level for the generation of electrical energy is known as a hydroelectric power station.

- In a hydro-electric power station, water head is created by constructing a dam across a river or lake.

- From the dam, water is led to a water turbine.

Hydro-electric Power Station

- The water turbine captures the energy in the falling water and changes the hydraulic energy (i.e., product of head and flow of water) into mechanical energy at the turbine shaft.
- The turbine drives the alternator which converts mechanical energy into electrical energy.
- Hydro-electric power stations are becoming very popular because the reserves of fuels (i.e., coal and oil) are depleting day by day.

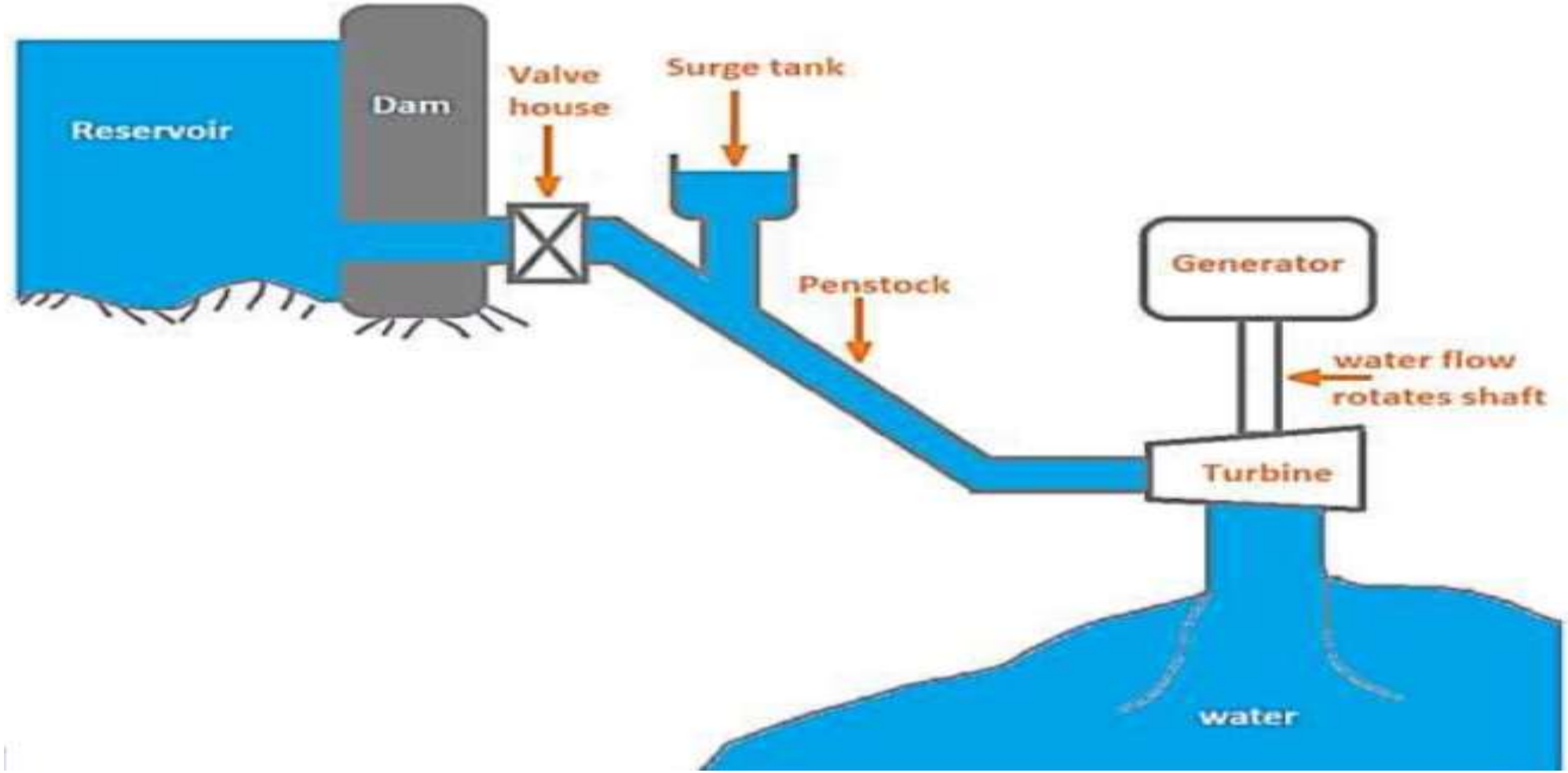
Advantages

- It requires no fuel; water is used for the generation of electrical energy.
- It is clean as no smoke or ash is produced.
- It requires small running charges because water is the source of energy which is available free of cost.
- It is simple in construction and requires less maintenance.
- It is robust and has a longer life.

Disadvantages

- It involves high capital cost due to construction of dam.
- There is uncertainty about the availability of huge amount of water due to dependence on weather conditions.
- Skilled and experienced hands are required to build the plant.
- It requires high cost of transmission lines as the plant is located in hilly areas which are away from the consumers.

Hydro power plant



Choice of Site for Hydro-electric Power Stations

- Availability of water.
- Storage of water.
- Cost and type of land.
- Transportation facilities.