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Paper Power generation
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Q4/ Briefly explain the Nuclear Power plant and also write down the merits and demerits of Nuclear Power plant.

Ans/ Nuclear Power Plant.

Nuclear Power plant heat water to produce steam The steam is used to spain large turbine that generate electricity. Nuclear Pawe plant use heat to produce during nuclear fission to heat water.

In nuclear fission, atoms are split apart to form smaller atoms, realeasing energy. fission take place inside the reactor of a nuclear Power Plant. At the center of the reactor is the core, which contains uranium fuel.

The uranium fuels is formed into ceramic pellets. each ceremic pellet produces about the same amount of energy as 150 gallons of oil. These energy rich pellets are stacked end to end in 12-foot metal

fuel rods. A bundle of fuel rods, same with hundreds of rods, is called a fuel assembly. A reactor core contains many fuel assemblies.

The heat produced during nuclear fission in the reactor core is used to boil water into steam, which turns the blades of a steam turbine. As turbine blades turn, they drive generator that make electricity. Nuclear power plant cool the steam back into water in a separate structure at the power plant called a cooling towers, or they use water from ponds, rivers or the ocean. The cooled water is then reused to produce steam.

Merits of nuclear power plant.

1) Produce no polluting gases.
2) Does not contribute to global warming.
3) very low fuel costs.
4) Low fuel quantity reduce mining and transportation effects on environment.
5) High technology research required benefits other industries.

2) Power station has very long life time.

Demerits of Nuclear Powe Plant:

2) waste is radioactive and safe disposal is very difficult and expensive.
2) Local thermal pollution from waste water affects marine life.
2) Large-scale accidents can be catastrophic.
2) Public perception of nuclear power is negative.
2) Costs of building and safely decommissioning are very high.
2) Cannot react quickly to change in electricity demand.

Q2/ How Solar thermal electric generation is possible

Ans

Solar thermal energy is a techology for harnessing solar energy for thermal energy (heat) requirement in industries, residential sector and commercial setup. Solar thermal collectors are classified by the united state energy information Administration as low-medium, or high temperature collectors. Low temperature collectors are flat plates generally used to heat swimming pools. medium temperature collectors are also usually flat plates

but are used for heating water or air for residential and commercial use.

High temperature collectors concentrate sunlight using mirrors or lenses and are generally used for fulfilling heat requirements up to 300 deg C / 20 bar pressure in industries, and for elector power production. However, there is a term that used for both the applications. Concentrated solar power (when the heat collected is used for power generation. CST and CSP are not replaceable in terms of application System designs:.

During the day the sun has different positions. for low concentration systems tracking can be avoided if nonimaging optics are used. for higher concentrations, however, if the mirrors or lenses do not move, then the focus of the mirrors or lenses changes (but also in these cases nonimaging optics provides the widest acceptance angles for a given concentration.) Therefore it seems unavoidable that there needs to be a tracking system that follows the position of the sun. (for solar photovoltaic a solar tracker is only optional).

The tracking System increases the cost and Complexity. with this in mind, different designs can be distinguished is how they Concentrate the light and track the position of the sun.

Q5/ How electric Generation is possible from Run off river and ocean wave.

Ans/ Run of the River:

Run of the river plants have no water storage facilities but may use low-level dam to increase the difference between the water intake level and the turbine. in this case the natural river flow generates electricity and the amount of power generates electricity and the amount of power generated fluctuates depending on the cycle of the river. Although run of the river technology can be used for large scale power generation. ~~it popular~~ it is commonly applied to supply individual communities with electricity with capacities of less than 30 Mw. This form of power generation is popular in rural areas of China. but has potential application in many place, including in the

United States. Run-of-the-river technology typically disrupts much less of the river's flow as compared to large hydro power dams.

Ocean wave:
As wind move over the surface of the ocean, it transfers energy to the water and creates waves Although variable in size and speed, waves are predictable and are constantly created. in U.S coastal water alone. the total ~~created~~ yearly wave energy is 2,100 terawatt hours. A variety of technologies are being tested to convert wave energy into electricity. Most system capture energy on the surface of wave are uses pressure differences just below the surface. These systems use the swells of waves to create pressure and move hydraulic pumps or pressurized air. whic in turn puts generators into motion. The environmental impacts of wave generators are not fully know. but are thought the minimal and site specific

The best potential sites for wave generation are ocean area with strong and currents. These area are between 30° and 60° latitude, Polar areas with frequent storms, area near the equatorial trade winds and the west coasts of continents. Hybrid, wind and wave technology for off shore energy farms are in development. Potential sites in the united states for hybrid wind wave energy foams include the coastal area of the east coast and the Pacific Northwest.

Q3) Discuss the situation of our current power generation from wind.

Wind energy:

Pakistan has a potential for wind energy specially in the Southern Coast and Coastal Balochistan. The wind speed is on average 7-8 m/s at some sites along the Keti Bandar - Gharo Corridor.

Particularly in the Southern region of Sindh and Balochistan, the technical potential of wind power is high along the 1,000 km of Coastline

where wind speeds range between 5 and 7 m/s. The potential capacity for wind energy is estimated at 122.6 GW per year, more than double of the country current power generation level. A newly completed wind farm in Gharo, Sindh province, is one of the series under construction in Pakistan to reduce the country's serious energy deficit. [5]

Projection for wind energy development until 2030

Year	Generation Plan (MW)	Cumulative wind Energy Capacity (MW)
2010	680	680
2011	200	880
2012	200	1080
2013	150	1230
2014	200	1430
2015	250	1680
2016	250	1930
2017	400	2330
2018	400	2730
2019	500	3230
2020	500	3730
2021-2030	5970	9700