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Assignment Power Generation
Module 2nd

Q1 How electric Generation is possible from Run of river and ocean wave.

Ans **Run-of-the-River:**

Run of the River plants have no water storage facilities but may use low-level dams 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 generated fluctuates depending on the cycle of the river. Although run-of-the river technology can be used for large scale

power generation, 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 flow as compared to large hydropower dams.

Ocean Wave :-

As wind moves 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 constantly created. In U.S coastal waters alone, the total yearly wave energy is 2,100 terawatt hours. A variety of technologies are being tasted to convert wave energy into electricity. Most systems capture energy on the surface of waves or use pressure differences just below the surface. These system use the swells of waves to create pressure and move hydraulic pumps or pressurized air, which in turn puts generators into motion. The environmental impacts of wave generator are not fully known, but are thought to be minimal and site specific.

The best potential sites for wave generation are ocean areas with strong wind currents. These areas are between 30° and 60° latitude, polar areas with frequent storms, areas near the equatorial trade winds, and the west coasts of continents. Hybrid wind and wave technology for offshore energy farms are in development. Potential sites in the united states for hybrid wind-wave energy farms indude the coastal areas of the East Coast and the Pacific Northwest.

Q⁼ How Solar thermal Electric generation is possible.

Ans Solar thermal power/Electric generation systems collect and concentrate sunlight to produce the high temperature heat needed to generate electricity. All solar thermal power systems have solar energy collectors with two main components: reflectors (mirrors) that capture and focus sunlight into a receiver. In most types of systems, a heat-transfer fluid is heated and circulated in the receiver and used to produce steam. the steam is converted into mechanical energy in a turbine, which powers a generator to produce electricity. Solar

thermal power systems have tracking systems that keep sunlight focused into the receiver throughout the day as the sun changes position in the sky. Solar thermal power plants usually have a large field or array of collectors that supply heat to a turbine and generator. Several solar thermal power facilities in the united states have two or more solar power plants with separate arrays and generators. Solar thermal power systems may also have a thermal energy storage system component that allows the solar collector system during the day,

and the heat from the storage system is used to produce electricity in the evening or during cloudy weather. Solar thermal power plants may also be hybrid systems that use other fuels (usually natural gas) to supplement energy from the sun during periods of low solar radiation.

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

Ans [redacted]

Wind energy is a form of solar energy. Wind energy (or wind power) describes the process by which wind is used to generate electricity. Wind turbines convert the kinetic energy in the wind into mechanical power. A generator can convert mechanical power into electricity. Mechanical power can also be utilized directly for specific tasks such as pumping water.

Wind Energy Basics :-

Wind is caused by the uneven heating of the atmosphere by the sun, variations in the earth's surface, and rotation of the earth. Mountains, bodies of water, and vegetation all influence wind flow patterns. wind turbines convert the energy in wind to electricity by rotating propeller-like blades around a rotor. The rotor turns the drive shaft, which turns an electric generator. three key factor effect the amount of energy a turbine can harness from the wind: wind speed, air density, and swept area.

- **Wind Speed :·**

The amount of energy in the wind varies with the cube of the wind speed.

- **Density of the Air :·**

The more dense the air, the more energy received by the turbine. Air density varies with elevation and temperature. Air is less dense at higher elevations than at sea level, and warm air is less dense than cold air.

- **Swept area of the turbine :·**

The large the swept area (the size of the Area through which the rotor spins), the more power the turbine can capture from the wind.

Q1 Briefly explain the nuclear power plant and also down the merits and demerits of nuclear power plant.

Ans A nuclear power plant is a thermal power station in which the heat source is a nuclear reactor. As is typical of thermal power stations, heat is used to generate steam that drives a steam turbine connected to a generator that produces electricity. As of 2014, the international Atomic energy agency reported there were 450 nuclear power reactors in opreation in 31 countries. Nuclear plants are usually considered to be base load stations since fuel is a small part

of the cost of production and because they cannot be easily or quickly dispatched. Their operations and maintenance and fuel costs are, along with hydropower stations, at the low end of the spectrum and make them suitable as base-load power suppliers. The cost of spent fuel management, however, is somewhat uncertain.

Generating electricity using nuclear reactors carries high risk but offers large rewards. In operation, a very small amount of nuclear fuel will consistently generate a very large amount of electricity and

generate very little polluting material. However, the financial costs of building and decommissioning a nuclear power station are very large, and the waste produced will remain radioactive - hazardous to humans and the environment - for thousands of years.

Advantages of Nuclear Power Plant :-

- A nuclear power plant cannot explode like a nuclear weapon because the fuel for uranium reactors is not enriched enough, and nuclear weapons require precision explosives to force fuel into a small enough volume to go supercritical.

- Most reactors require continuous temperature control to prevent a core meltdown, which has occurred on a few occasions through accident or natural disaster, releasing radiation and making the sorrounding area uninhabitable.
- Plants must be defended against theft of nuclear material and attacks by enemy military planes or missiles.
- Produces no polluting gases.
- Does not contribute to global warming.
- Power station has very long lifetime.

Disadvantages of nuclear power plant :-

- The nuclear power plant has the following numerous disadvatages. that multiple and unexpected failures are built into society's complex and tighty-coupled nuclear reactor systems.
- Such accidents are unavoidable and cannot be designed arround.
- An interdisciplinary team from MIT has estimated that given the expected growth of nuclear power from 2005 to 2055, at least four serious nuclear accidents would be expected in that period.
- The MIT study does not take into account improvement is safety since 1970.

- The most serious accidents to date have been the 1979 three Mile Island accident, the 1986 chernobyl disaster, and the 2011 Fukushima Daiichi nuclear disaster, corresponding to the beginning of the operation of generation II reactors.
- local thermal pollution from wastewater affects marine life.
- Public perception of nuclear power is negative.