NAME : M. HAROON
ID: 16216
Assignment: Power Generation
Module: 2nd B tech (E)
Instructor: Engr. Sajid nawaz khan

Q1: How electric generation is possible from Run off river and ocean wave?

Ans: **Run-off-river:**

Run of the river hydroelectricity is a type of hydroelectric generation whereby the natural flow and elevation drop of a river are used to generate electricity. Power stations of this type are installed on rivers with a consistent and steady flow, either natural or through the use of a large reservoir at the head of the river.

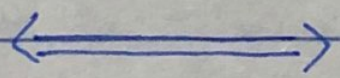
The power is generated only when enough water is available from the river. When the stream flow reduces below the design flow value, the generation will reduce as the water does not flow through the intake structure into the turbine.

- **Ocean wave:**

Wind blows across the

ID: 16216 Name: HAROON

ocean, creating waves. The sun heats up air at different places around the globe, which creates wind that blows over ocean surfaces. waves approach land. Waves encounter machines. Machines convert waves into electricity.
Electricity is applied to the grid or other needs.
Ocean waves are converted to electricity with wave energy converter. or WEC, devices. The surface portion moves faster than the submerged part, and the WEC converts that relative motion into electricity.



ID: 16216 Name: HAROON

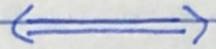
Q2: How solar thermal Electric generation is possible?

Ans: Solar thermal power plants are electricity generation plants that utilize energy from the sun to heat a fluid to a high temperature. This fluid then transfers its heat to water, which then becomes superheated steam. This steam is then used to turn turbines in a power plant, and this mechanical energy is converted into electricity by a generator. This type of generation is essentially the same as electricity generation that uses fossil fuels, but instead heats steam using sunlight instead of combustion of fossil fuels.

These systems use solar collectors to concentrate the sun's rays on one point to achieve appropriately high temperatures. There are two types of systems to collect solar radiation and store it: passive systems and active systems. Solar thermal power plants are considered active systems. These plants are designed to operate

ID: 16216 Name: HAROON

using only solar energy, but most plants can use fossil fuel combustion to supplement output when needed.



Q3: Discuss the situation of our current power generation from wind?

Ans: Wind power generation is power generation that converts wind energy into electric energy. The wind generating set absorbs wind energy with a specially designed blade and converts wind energy to mechanical energy, which further drives the generator rotating and realizes conversion of wind energy to electric energy.

The commonly used wind power generation systems include the direct driven wind power generating set and the double fed wind power generating set; the direct-driven wind power generating set is connected to the grid through a double fed converter. Fig 1.3 shows a direct-driven permanent magnet synchronous wind power generating system. For this system, wind energy drives the wind turbine rotating, which further drives the generator running,

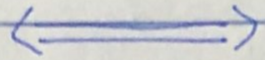
ID:16216 Name: HAROON

Converting mechanical energy into electric energy. The stator of the permanent magnet synchronous generator outputs AC power with variable amplitude and frequency. By passing through an AC/DC rectifier, the AC power will be inverted into DC power and then, with a DC/AC inverter, the output DC power will be inverted to AC power and connected to the AC grids. The power flows unidirectionally from the wind turbine to the AC grid. When it is only required to be connected to DC grids, the DC/AC inversion step can be omitted.

Fig 1.4 shows the double fed wind power generation system. Both the stator and the rotor of the double fed generator can supply power to the grid, in which the rotator is connected to the grid through a convertor, while the stator is connected to the grid directly. In case of speed change of the generator rotator, the convertor will ensure the stator rotating magnetic field and the grid are in the same frequency

ID: 16216 Name: HAROON

by regulating the frequency of exciting current.



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 comes from nuclear fission. Nuclear power plants heat water to produce steam. The steam is used to spin large turbines that generate electricity. Nuclear power plants use heat produced during nuclear fission to heat water.

In nuclear fission, atoms are split apart to form smaller atoms, releasing energy. Fission takes place inside the reactor of a nuclear power plant. At the center of the reactor is the core, which contains uranium fuel.

The uranium fuel is formed into ceramic pellets. Each ceramic 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, some with

ID: 16216 Name: HAROON

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 steam turbine. As the turbine blades turn, they drive generators that make electricity. Nuclear plants cool the steam back into water in a separate structure at the power plant called a cooling tower, or they use water from ponds, rivers or the ocean. The cooled water is then reused to produce steam.

Merits and demerits of nuclear power plant:-

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 ~~nucle~~ electricity and generate very little polluting material. However, the financial costs of building and decommisioning a nuclear power station a very large, and the waste produced will remain radioactive - hazardous to humans and the enviroment for thousands of years.

- Produces no polluting gases.
- Does not contribute to global warming.
- very low fuel costs.

ID:16216 Name:HAROON

- Low fuel quantity reduces mining and transportation effects on enviroment.
- High technology research required benefits other industries.
- Power station has very long lifetime.

- Waste is radioactive and safe diposal is very difficult and expensive
- Local thermal pollution from wastewater affects marine life.
- Large-scale accidents can be catastrophic.
- Public perception of nuclear power is negative.
- Costs of building and safely decommissiong are very high.
- Cannot react quickly to changes in electricity demand.