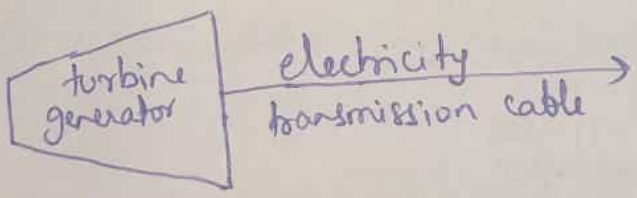
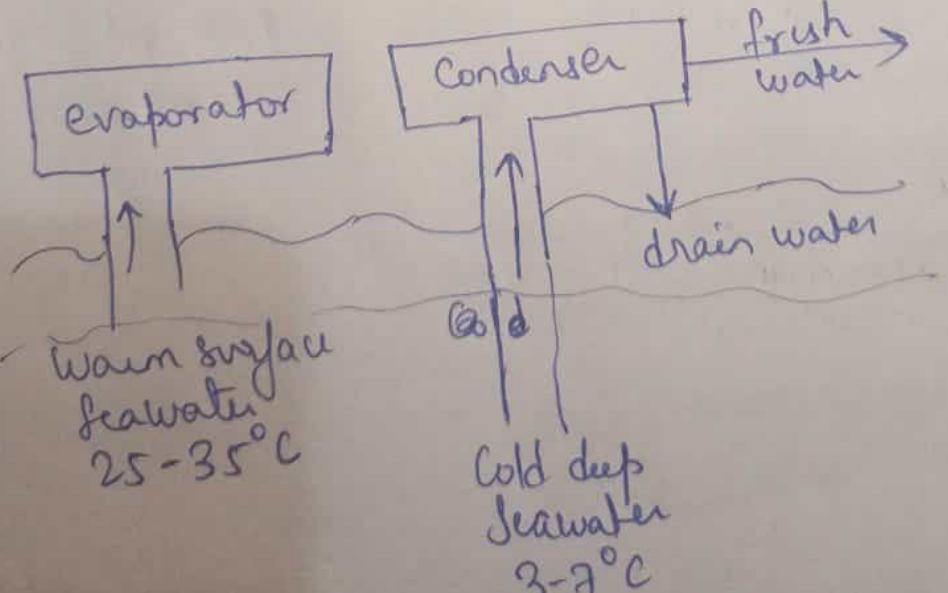
OTEC :-

Working principle of OTEC is that "there is a temp. difference between water at bottom of sea and water at top, this temp. difference can be used to operate a heat engine."

Most of radiation is absorbed at surface layer of water. Mixing of hot & cold water is prevented because no thermal convection occur between hot & cold water layer. This means that surface layer will act as "source" and cold layer act as a "sink". Therefore it is essential to connect the reversible heat engine between source & sink to produce work, that can be converted into required application.

→ A minimum temp. diffence of 20°C is required for practical energy convesion.





Working :-

1) Warm Seawater Intake :- Surface seawater is pumped into a system where it transfer heat to working fluid
2) Vaporization :- Working fluid (often ammonia) vaporizes due to heat absorbed by warm seawater
3) Turbine operation :- Vapourized fluid is used to drive a turbine, converting thermal energy to mech.
4) Electricity Generation :- Turbine connected to generator which produces electricity on rotation
5) Cold Seawater Condensation :- Cold seawater is pumped to condense the vaporized fluid back to liquid.
6) Return of Condensed fluid :- The liquid working fluid is return to warm seawater intake to restart cycle.

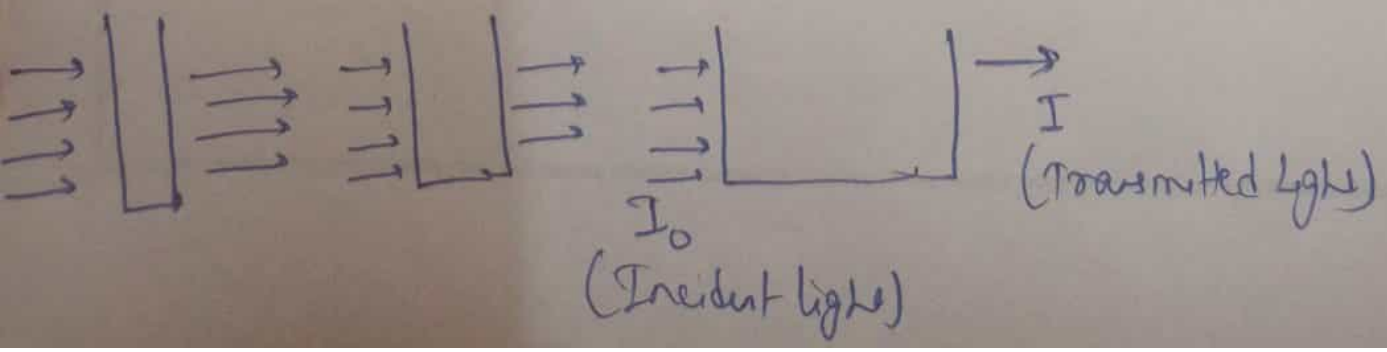
Lambert's Law of Absorption :-

Also known as Beer-Lambert Law, describes the relationship between absorption of light by a substance & concentration of that substance in solution.

Law state that "absorbance of a solution is directly proportional to concentration of the absorbing substance and path length of light through a solution".

Mathematically $A = \varepsilon l c$ → concentration of substance
→ path length of light
→ molar absorptivity

A → Absorbance



Tidal Power plant Selection :-

1) Tidal Range :- Should be high for maximum energy potential
2) Tidal Current :- Opt for sites with strong and consistent tidal current
3) Geography → Suitable geography like bays or estuaries
4) Environment impact → Clear surrounding ecosystem
5) Infrastructure
6) Water Depth :- Ensure sufficient depth for tidal turbines & ease of installation.
7) Climate :- Take account of weather condition & storms.
8) Economic Viability.
9) Access.

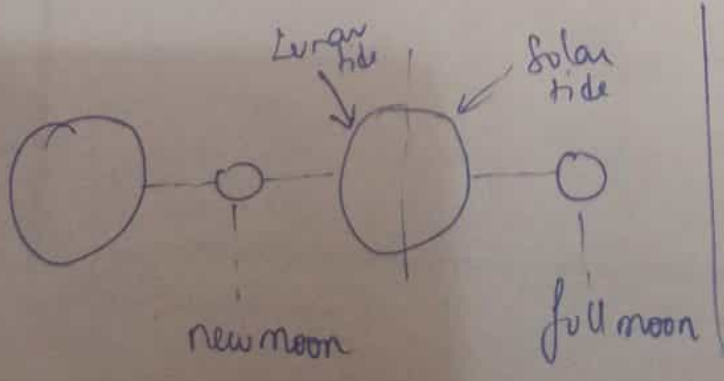
Spring Tide VS Neap Tide

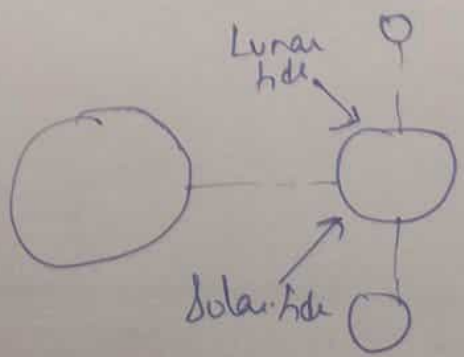
Spring Tide

→ occur during full moon & new moon phases when Sun, Earth & Moon are aligned
→ Gravitational pull of Sun & moon combine, causing high tides & lower low tides.
→ extreme tidal range

Neap tide

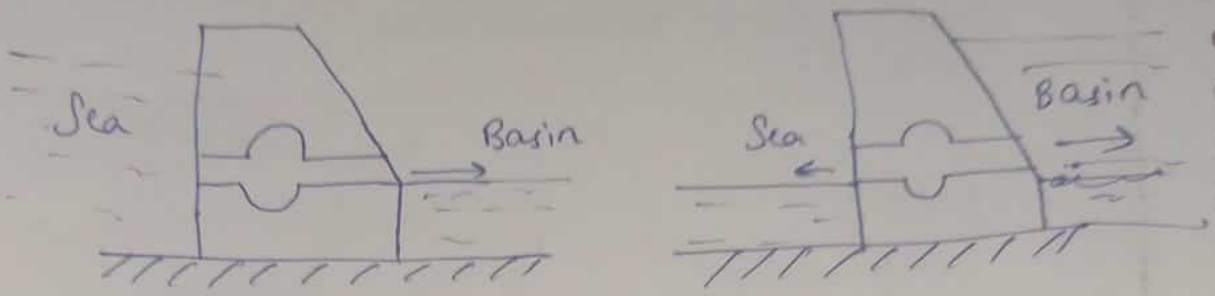
→ occur during first & third quarter of moon when Sun & moon are at right angle relative to earth.
→ The gravitational forces partially cancel out each other leading to lower high tides & higher low tides.
→ Smaller tidal range





Types of Tidal Power Plant:

1) Single Basin Tidal System



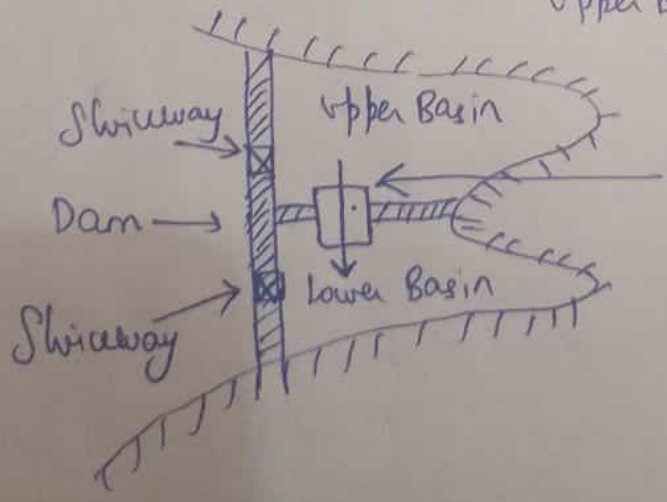
(a) (b)

→ It is simplest system to generate tidal power
→ It has only one basin to store water.
→ The basin is seperated from ocean/sea by dam
→ Turbines & generator are mounted inside ducts of dam.

further dinded into
- (a) Single ebb cycle system
- (b) Single tide cycle System

2) Double Basin Tidal System:-

→ has 2 basin at different level.
→ Upper Basin always have higher water level
→ Lower Basin discharge water at Low tide.
Upper Basin discharge at high tide.
→ turbines generate power



Adv of Tidal Power Plant :-

1) Completely independent of rain & uncertainity
2) Large area of valuable land is not required
3) It is inexhaustible & renewable source of energy.
4) free from pollution
5) Net cost of power generated is low.

Disadv :-

1) Out put is not uniform due to variation in tidal range
2) fear of corrosion of machine due to corrosive sea water
3) It is difficult to carry construction in sea.
4) Power transmission cost is high as sea is far from centre.
5) tidal power plant is costly.

Adv. of Wave energy :-

1) Pollution free 2) free & renewable 3) Not require large area of land

Disadv :-

1) Lack of dependability 2) cost of repair, replacement & maintence
3) Construction is complicated.

Adv. of OTEC :-

1) clean form of energy 2) do not occupy large land area.
3) No payment for energy required.

Disadv :-

→ 30% of power is used to pump water
→ Construction is difficult
→ Very heavy investment is required
→ Material may get corrosive due to corrosive nature of sea water

Waves :- Disturbance that travel through a fluid medium.

Its Characteristics :-

1) Crest → highest point of wave
2) trough → lowest point
3) Wavelength → horizontal distance b/w crest & through of two waves.
4) Wave height → vertical distance b/w crest & through
5) Amplitude → half of wave height