

Section-4

Q1 Explain the basic principle of OTEC. Also explain the open OTEC cycle.

⇒ Principle of OTEC cycle as:-

① The principle of OTEC is that there is a temperature difference between water at the bottom of the sea and the water at the top.

② This temperature difference can be used to operate a heat engine and most of the radiation is being absorbed at the surface layer of water.

③ Therefore it is essential to connect the reversible heat engine between source and cold sink to produce work that can be converted into required application.

④ The absorption of solar radiation in the water varies and can be explained by Lambert's law.

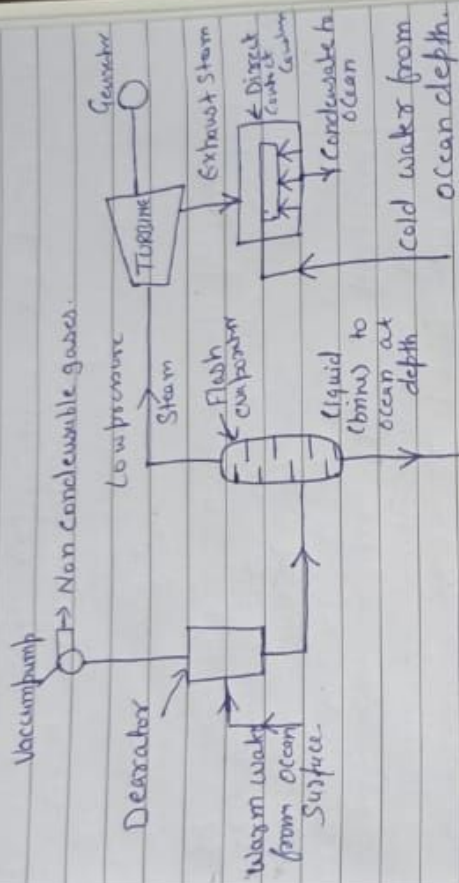
$$- \frac{dI_y}{dy} = \mu I$$

$$I_y = I_0 e^{-\mu y}$$

$I_y$  = Radiation intensity at depth  $y$  from water.

$I_0$  = Radiation intensity of water surface.  
 $\mu$  = Extinction.

## OPEN OTEC cycle



① In this system, the warm water from ocean surface is admitted through the dewarator to the flash evaporator which is maintained under high vacuum.

② As a result, a low pressure steam is generated due to throttling effect and the remaining liquid is discharged back to the ocean at high depth.

③ The exhaust steam from turbine is discharged into a direct contact type heat exchanger and mixed with cold water drawn from the ocean at a depth of about 1000m.

④ The mixture of condensed steam and ocean cold water are discharged into the ocean.