UNIT III
MACHINERY

AUXILIARY MACHINERY
The machinery on board a ship can be divided into two categories; main propulsion engine and auxiliary machinery.
The auxiliary machinery in machinery spaces includes pumps, separators, fresh water generators, heaters, coolers, oily water separator, boilers, air compressors and bow thrusters.
The other auxiliary machinery used for cargo and deck operations includes steering gears, air conditioning machines, refrigerating machines, cargo winches, cranes, fire fighting installations, lifeboat engines and many others.
The generators form the heart of the electrical design.

At least two generators for a ship's main electrical power system are required by the international regulations.
Boilers produce steam.
The common types of boilers are; fire-tube boilers and water-tube boilers.
Smoke tube boiler
○ The capacity of steam production of fire-tube boilers is less than the water-tube boilers.

○ Mostly fire-tube boilers are used in ships except tankers.
Fresh water generators (evaporators) convert the sea water to fresh water.
Simple single effect evaporator
The most common type makes use of the **distillation** process. Using the heat from the engines, the seawater is **evaporated** under low atmospheric pressure. The vapour is then led into a cooling section and it condenses into water.
PUMPS

- Pumps are the biggest group of machinery on board a ship.
- They are installed in every mechanical system that needs cooling, lubrication, and power transmission.
- They are also used to transfer fluid between tanks, for fire fighting, or washing.
Heat exchangers are used to transfer heat from one medium to another. Sea water is used to cool lube oil and piston. Steam is used to heat up fuel oil.
Refrigeration is needed on board a cargo ship for storing of food supplies. Food supplies are stored in cold rooms. The cold rooms are generally vegetable and fruit room, meat room, and fish room.
The air-conditioning system is usually for conditioning air in the accommodation spaces.
Air compressors are used to supply compressed air.
The compressed air is used for starting engine, control air supply, service air (e.g. air for horn).
There are two types of separators; purifiers and clarifiers.

Oil purifiers are used on board ship to condition fuel oil and lubricating oil.

Oily water separators are used to separate oil from bilge water before the bilge is pumped.
(Above) Foot-off separator and TMA in a deep intake machinery space adjacent to the main engine room.

(Below) The main engine power meter indicates the instant and average output as a function of rpm.

(Right) Rotor C11 carries a score piston and liner in a scheduled cylinder maintenance.
State that the following sentences true or false according to the text.

1- Generators can be at any number on board a ship.
2-The fresh water is made by distilling
Oily water separator is used to separate oil and bilge water.
4-The starting air is provided from purifiers.
**Condition (v)**-To bring into desired condition

**Distillation (n)**-Purifying a liquid by boiling it and condensing its vapours
Evaporate (v)-To change into vapour
Generate (v)-To produce (energy)
Purify (v)-Remove impurities by the process of distillation
Write the verb forms.

1. Boiler
2. Clarifier
3. Cooler
4. Exchanger
5. Heater
Rewrite the sentences using gerund.

1- a) The turbine is used to generate electric power with steam.

b) The turbine is used for generating electric power
- Lubricator is used to feed the lubricating oil nozzles.
Boilers are used to supply steam for machinery operated by steam.
4- Fresh water generators are used to convert the sea water to fresh water.
8-Which is not located in the engine room?

a. cooler
b. separator
c. heat exchanger
d. evaporator
e. steering gear
8-Which is not located in the engine room?

e. steering gear
What is used to separate oil from bilge water?

a. compressor
b. fresh water generator
c. separator
d. heat exchanger
e. cooler
What is used to separate oil from bilge water?

- separator