

TWOMARKS
UNIT-IV GAS AND DIESEL POWER PLANT:

1. List the advantages of gas turbine power plant.

1. Low capital cost
2. High reliability
3. Flexibility in operation
4. Capability to quick start
5. High efficiency e.t.c.

2. List the major components of gas turbine.

1. Compressor
2. Combustion chamber and
3. Turbine

3. List the types of gas turbine power plants.

1. Open cycle gas turbine powerplant
2. Closed cycle gas turbine power plant

4. List the disadvantages of gas turbine power plant.

1. No load and Partial load efficiency is low
2. High sensitive to component efficiency
3. The efficiency depends on ambient pressure and ambient temperature
4. High air rate is required to limit the maximum inlet air temperature. Hence exhaust losses are high
5. Air and gas filter is required to prevent dust into the combustion chambers.

5. Define regenerator efficiency.

The regenerator efficiency is defined as:

$$= \frac{\text{Actual temperature rise of air}}{\text{Maximum temperature rise possible}}$$

6. List the factors which affect the performance of gas turbine power plants.

1. Part load efficiency
2. Fuel consumption
3. Air mass flow rate
4. Thermal efficiency
5. Regeneration

7. What are the working fluids in gas turbine?

1. Air
2. Helium
3. Argon
4. Carbon dioxide

8. List the various types of diesel plants.

Based on number of strokes:

- (a) Two stroke diesel engine
- (b) Four stroke diesel engine

Based on orientation:

- (a) Horizontal diesel engine
- (b) Vertical diesel engine

Based on number of cylinders:

- (a) single cylinder
- (b) Multi cylinder

And other type like naturally aspirated, superheated etc.,

9. List the components of diesel power plant.

- 1. Diesel engine
- 2. Air intake system
- 3. Exhaust system
- 4. Fuel system
- 5. Cooling system
- 6. Lubricating system
- 7. Starting of engine

10. List the various functions of fuel injection system.

- 1. It filters the fuel
- 2. Monitor the correct quantity of fuel to be injected
- 3. Timing of the injection process
- 4. Regulates the fuel supply
- 5. Fine atomization of fuel oil
- 6. Distributes the atomized fuel properly inside the combustion chamber

11. List the classification of oil injection system.

- (a) Common rail injection system
- (b) Individual pump injection system
- (c) Distributor system

12. List the reason why the cooling system is necessary for a diesel engine.

- 1. To avoid deterioration of lubricating oil
- 2. To avoid damages and overheating of piston
- 3. To avoid uneven expansion which results in craking
- 4. To avoid pre-ignition and detonation or knocking
- 5. To avoid reduction in volumetric efficiency and power output of the engine

13. What are the methods of cooling system used?

- 1. Air cooling
- 2. Water cooling

14. List the methods adopted for circulating the water in a cooling system.

- 1. Thermosiphon cooling
- 2. Forced cooling by pump
- 3. Thermostat cooling

4. Pressurised water cooling
5. Evaporative cooling

15. What are the important functions of a lubricating system?

1. Lubricating
2. Cooling
3. Cleaning
4. Sealing
5. Noise absorption

16. List the various types of lubricating system used in diesel engine.

1. Mist lubricating system
2. Wet sump lubrication system
3. Dry sump lubrication system

17. What are the starting methods of diesel engine?

1. By an auxiliary engine
2. By an electric motor
3. By compressed air

18. List any four advantages of diesel power plant.

1. It is easy to design and install
2. It is easily available in standard capacities
3. They can respond to load changes
4. They have less stand by losses

19. List any four disadvantages of diesel power plant.

1. High operating cost
2. High maintenance and lubrication cost
3. Capacity is restricted
4. Noise pollution

20. List any four applications of diesel power plant.

1. Used as peak load plants
2. Suitable for mobile plants
3. Used as standby units
4. Used as emergency plant.

REVIEW QUESTIONS:

1. With PV and TS diagram explain the effect of intercooling, reheating and regeneration in a gas turbine plant(AUC, Nov/Dec 2008)
2. Enlist the advantages and disadvantages of diesel power plant and discuss the essential components of the diesel power plant with neat layout.. (AUC, Nov/Dec 2008)
3. Sketch the layout of a diesel engine power plant(AUC, Apr/May 2008)
4. Write down the application of diesel power plant (AUC, Apr/May 2008)
5. Discuss the working of a modern gas turbine power plant of capacity, 30MW with an illustration or two. (AUC, May/June 2006)
6. Explain the Brayton cycle and derive an expression for the work ratio.

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Unit - IV

1. Draw a schematic diagram of hydro power plant
 Aim at harnessing from water
 Flow under Pressure.

Components:-

Water Reservoir:-

Continuous availability of water is basic
 necessity for hydro power plant.

Dams:- Dam used in hydro plant to increase height of
 water level & increasing capacity of reservoir

Spill way:-
 water at a certain level in reservoir. The
 dam also helps to increase working head of
 Power plant

Trash rack:-

water taken from dam or from fore bay
 is provide with trash rack

Pressure tunnel:-

carry water from reservoir to surge tank

Penstock:-

pipeline fixed b/w surge tank & prime mover
 is known as penstock

Fore bay:-

stores water temporarily

Surge tank:- (Diagram)

Sudden rise of pressure of the
 penstock due to sudden back flow of water

2) Draw & explain working of an open OTEC cycle Power Plant.

warm ocean water converted in to flash steam in an evaporator. Condensate is discharge in to sea in an open cycle.

In this OTEC warm water, from ocean surface is admit in to evaporator. evaporator main tank at vacuum pressure

Steam turbine converts thermal energy in to mechanical energy. steam is comparatively at low pressure & high specific volume.

Exhaust steam from turbine is condensed

Limitation:-

- (i) Turbine is physically large
- (ii) cost of plant high.

closed cycle:-

working fluid is circulated through closed

- 1. Heat exchanger
- 2. vapour turbine
- 3. vapour Condenser
- 4. Liquid Pressurizer

working fluid extract heat from warm ocean water & vapourised. vapour having thermal energy are

expanded in vapour turbine

The expanded vapour from turbine is condensed in Condenser. Liquidified working

fluid is pass through Pressurizer

3. with neat sketch explain the working principle of tidal power plant
→ Periodic rise & fall of water level of sea which are carried by action of sun & moon on water of earth called tide.

Tidal Energy is a form of hydro energy recurring with every tide

Components of tidal power plants:-

- (i) Dam to form pool or basin
- (ii) Power house
- (iii) Sluice ways from basin to sea

(i) Dam:-
Function of dam to form a barrier b/w sea and basin.

(ii) Sluice ways:-
Fill basin during high tide or empty the basin

Power house:-
Consist turbine, generator & other auxiliary equipment

(a) single Basin arrangement (b) Double basin

single Basin:-

→ only one basin - intermittent & mostly off peak load period on daily load curve.

The turbine generator units mount with in duct inside dam.

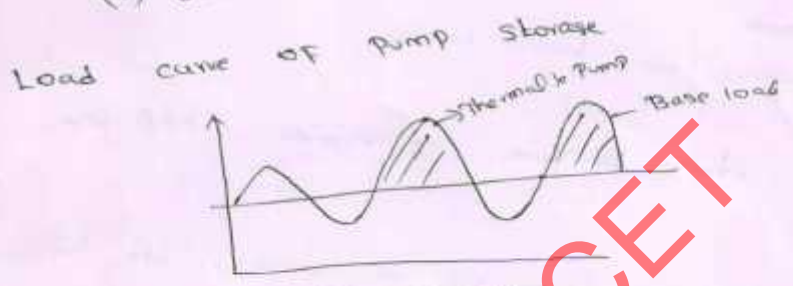
when there is incoming tide, sea level are equal the turbine conduit is closed

Double basin arrangement:- Diagram & working principle of double basin

f. with neat sketch explain in brief about Pumped Storage Power Plant:-

When ever old & inefficient thermal station are available they are generally used. Pumped storage plant provide following advantages

- (i) Thermal plants are loaded more economically
- (ii) Pumped storage store energy using off peak energy of thermal plant
- (iii) wastage of off peak energy



Types of operating cycles:-

- (i) Daily Peak load operation
- (ii) weekly operation
- (iii) yearly operation

Types of Pumped storage:-

- 1) over ground high head/ medium head low head
 - 2) under ground high head
- over ground
- (i) upper basin
 - 2) dam
 - 3) Penslock
 - 4) Power house
 - 5) Lower basin

5) Describe with help of neat sketch the working of solar thermal receiver system. Also enumerate advantage & disadvantage of concentrating collector over flat collector.

Solar thermal system converts sunlight into heat for various forms of end use. of these cycles loop made of different materials are at different temperatures.

$$\alpha_s = \frac{q_t}{(T_h - T_c)} \Rightarrow \frac{\Delta V_{oc}}{T_h - T_c} = \frac{dV_{oc}}{dT}$$

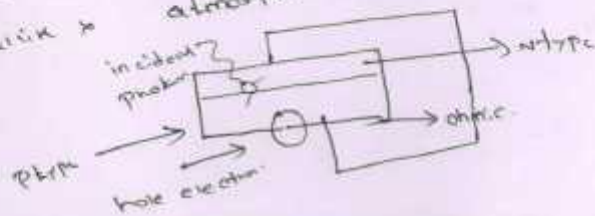
When current pass through two different material one junction hot & other cold

$$\Delta P = \frac{\Delta V_{oc}}{I}$$

$$\Delta T = \frac{\Delta Q / \Delta x}{I (\Delta T / \Delta x)}$$

These 3 effects are reversible. Advantage along with their favorable cost allow flat plate collector to used. Diagram of flat plate solar collector.

6) Explain in brief about solar photovoltaic system. Also known as solar cells. directly convert sunlight to electricity. In an energy & environment conscious society, photovoltaic is most prominent in various semiconductor most of commercial made of crystalline & atmospheric silicon.

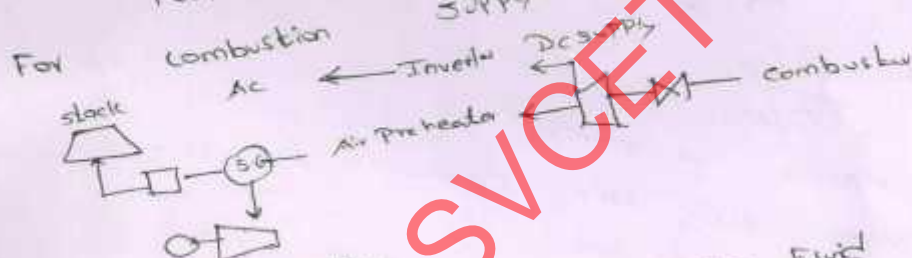


For even greater Power modules can be interconnected in larger groups to form array. The dc electricity by solar cell array is usually pass through Power Conditioner for voltage & Power regulation & convert to Ac.

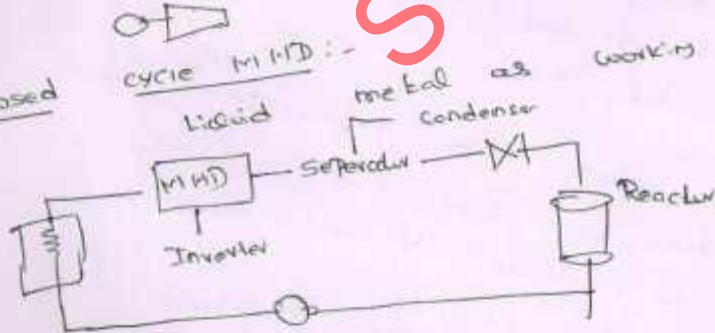
7) Briefly explain the classification of MHD system

(i) open cycle system
 (ii) closed cycle system
 * seeded inert gas system
 * Liquid metal

Open MHD System:-
 Fuel burnt combustion chamber, air required
 air preheater



Closed cycle MHD:-
 Liquid metal as working fluid



Advantages:-

1. Large amount of Power generated
2. Reduce loss
3. Permit better fuel
4. utilize peak power generation
5. size is small

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