

SCAD ENGINEERING COLLEGE

DEPARTMENT OF MECHANICAL ENGINEERING

POWER PLANT ENGINEERING

TWO MARK QUESTIONS AND ANSWERS

ACADEMIC YEAR 2015 - 2016

UNIT I

INTRODUCTION TO POWER PLANT AND BOILERS

1 What is meant by power plant?

Power can be defined as the rate of flow of energy and state that a power plant is a Unit built for production and delivery of a flow of mechanical work and electrical energy. A machine or assembling of equipment that produces and delivers a flow of mechanical and electrical energy is a power plant.

2 What are the types of power plants?

- Steam power plant
- Hydro electric power plant
- Diesel power plant
- Nuclear power plant
- Gas turbine power plant
- MHD power plant

3 List the factors of power plant performance.

The performance of a power plant can be expressed through some common Performance factors as

1. Heat rate
2. Capacity factor
3. Economic efficiency
4. Load factor
5. Operational efficiency

4 What are the major power limitations of conventional energy sources?

1. Resources for power generation i.e, coal, gas etc., are limited
2. The hydro power is seasonal and varies depending upon the rainfall in the catchment areas
3. Submersion of land area due to raise in water level
4. Centralized power generation and distribution of the same to long distances will result in high losses.
5. The energy conversion process from thermal power projects results in emission of green house gases

5 List out the various conventional and non conventional power plant

Types of conventional power plant:

1. Hydro power plant
2. Steam power plant
3. Nuclear power plant
4. Gas turbine power plant

Types of non-conventional power plant:

1. Tidal power plant
2. Wind power plant
3. Geothermal power plant
4. Solar power plant
5. Wave power plant
6. MHD Generation

6 List the thermal power plant in Tamilnadu.

Alathiur (2*18MW), Tamilnadu, Madras cements

Ennore (2*60MW,3*110MW) Tamilnadu Electricity Board

Neyveli (6*50MW,2*100MW) Tamilnadu Neyveli lignite corp Lt

7 What is the use of surge tank?

The surge tank is used to provide better regulation of water pressure in the system. The surge tank controls the water when the load on the turbine decreases and supplies water when the load on the turbine increases. Thus, surge tank controls the pressure variations resulting from the rapid changes in water flow in penstock and hence prevents water hammer

8 Explain about penstock?

The pipe between surge tank and prime mover is known as penstock. It is designed to withstand high pressure. It is made up of reinforced concrete. In very cold areas, the penstock is buried to prevent ice formation and to reduce the expansion joints

9 What is the use of spill Ways?

Spillway is like a safety valve of the dam. It discharges major flood without damaging the dam. It keeps the reservoir level below the maximum level allowed

10 What are the uses of air filter and superchargers in diesel engine power plant?

The purpose of air filter is to filter the air from dust and other suspended particles. The purpose of super charger is to increase the pressure of the engine to increase power of the engine.

11 What is the use of draft tube?

The draft tube is used to regain the kinetic energy of water coming out of reaction turbine. It enables the reaction turbine to be placed over tailrace level.

12 What is the function of cooling system in Diesel power plant?

The function of cooling system is to remove heat from the engine cylinder to keep the temperature of the cylinder in low range and extend engine life.

13 What is the purpose of intercooler in gas turbine power plant?

Since the power required to compress the air is less in isothermal process it is required to maintain the, temperature of air constant as far as possible. Hence the air leaving the L.P. compressor is cooled by intercooler and then passed to the H.P compressor.

14 Name important high pressure boilers?

- La Mont boiler
- Benson boiler
- Loffler boiler
- Velox boiler.

15 What is the main purpose of high-pressure boilers?

The high-pressure boilers are used to increase the efficiency of the plant and to reduce the cost of electricity production.

16 What are the assumptions made for air standard cycle analysis?

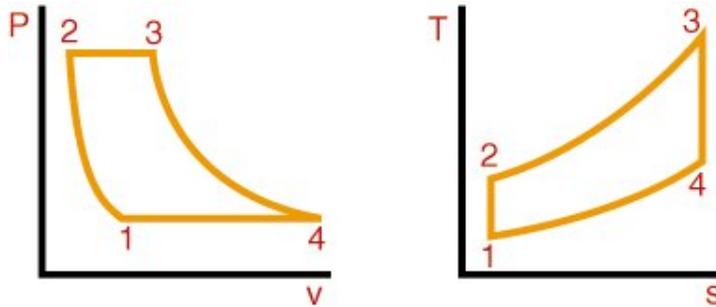
- ❖ The working medium is a perfect gas throughout
- ❖ The working medium Does not undergo any chemical change throughout cycle.
- ❖ The compression and expansion process are reversible adiabatic.
- ❖ The operation of the engine is friction less

17 What is the function of economizer?

Feed water from the feed tank is supplied to the economizer by feed pump. The economizer is used to preheat the water before it goes the boiler. There is a heat exchanger from the hot gases to the feed water

18

Draw the P-V and T-S diagram of the Brayton cycle.



19 Explain re-heat cycle.

In reheat cycle, steam is extracted from a suitable point in the turbine and reheated with the help of flue gases in the boiler.

20 What is regenerative cycle?

The feed water is heated with help of steam in a reversible manner, the temperature of steam and water is same at any section such type of heating is known as regenerating.

21 List any four advantages of hydro power:

1. Water source is perennially available
2. Running cost is very low
3. Non-polluting
4. Power generation can be switched on and off in a very short period

22 What is a surge tank?

A surge tank is a small reservoir in which the water level rises or falls to reduce the pressure swings during opening and closing of inlet valve. The surge tank is not required for run off plants and medium head plants.

23 What is a Draft tube?

The draft tube allows the turbine to be set above the tail race to facilitate inspection and maintenance. It also regains the major portion of the kinetic energy at the runner outlet by diffuser action. The draft tube can be a straight conical tube or an allow tube

24 List the advantages of impulse turbine:

1. Greater tolerance of sand and other particles in the water

2. Better access to working parts
3. No pressure seals around the shaft
4. Easier to fabricate and maintain
5. Better part-flow efficiency

25 List any four pumped storage hydro power plants in India:

1. Bihar, Maharashtra, 150 MW
2. Kadamparai, Coimbatore, Tamilnadu, 400MW
3. Nagarjuna Sagar PH, Andhra Pradesh, 810MW
4. Purulia pumped storage project, Avodhva hills, West Bengal, 900MW
5. Srisaillam Left Bank PH, Andhra Pradesh, 900 MW
6. Tehri Dam, Uttranchal, 1000 MW

26 What are the essential elements of hydro power plant?

1. Catchment area
2. Reservation
3. Dam
4. Surge tanks
5. Draft tubes
6. Power house
7. Switched for transmission of power

27 What is meant by catchment area and explain its function:

The whole area behind the dam is called the catchment area. The rain water in the area will be drained into the dam through a dam or river.

28 Explain Reservoir:

A reservoir may be natural, like a lake on a mountain or artificially built by erecting a dam across a river.

29 Define surge tank:

A Surge tank is a small reservoir in which the water level rises swings during Opening and closing of inlet valve.

30 What is a mini and micro Hydro plant?

The mini power plants operate with 5m-20m head and produce about 1 MW to 5MW of power.

The micro power plants require a head less than 5m and produce 0.1 MW to 1

31 What is meant by propeller turbine?

The basic propeller turbine consists of a propeller. Inside it consist of a Continuation of the penstock tube.

32 Define turbines:

A turbine converts energy in the form of falling water into rotating shaft power. The selection of best turbine for any particular site depends on the site characteristics.

33 What are the disadvantages of impulse turbine?

They are unsuitable for low-head sites because of their low specific speeds.

34 What is pelton turbine?

A pelton turbine consists of a set of specially spread buckets mounted on a Periphery of a circular disc. It is turned by jets of water which are discharged from one or More nozzles. .

35 What is meant by reaction turbines?

Francis turbine and propeller turbines are the reaction turbines. The reaction Turbines rotate faster than impulse turbine.

36 What is meant by Kaplan turbine?

The pitch of the propeller blades together with wicket gate adjustment enables Reasonable efficiency to be maintained under part flow conditions. Such turbines are Called as Kaplan turbines

37 Define twin runners:

Two runners can be placed on the same shaft either side by side or on opposite Sides of the generator. This configuration is unusual and would only be used if the Number of jets per runner had maximized.

38 State the advantages of impulse turbine over reaction turbine:

Impulse turbine are usually cheaper then reaction turbine because there is no need for a specialist pressure casing

UNIT II

STEAM POWER PLANT

1 **Name the two types of coal handling?**

- Out plant handling
- In plant handling.
-

2 **Write about out plant handling?**

Out plant handling includes the handling of coalmine to the thermal power plant. These handlings are outside the plant in the following ways.

- Transportation by sea (or) river
- Transportation by rail
- Transportation by road
- Transportation of coal by pipeline.
-

3 **Why the preparation of coal is necessary?**

The coal from coal mines cannot be directly fed into the furnace. Proper preparation of coal should be done before feeding the coal to the furnace. In the coal preparation, the coal passes through the different equipments like 1. Crushers 2. Sizers 3. Driers and Magnetic Separators.

4 **Name the different types of coal transforming equipments?**

1. Belt conveyors 2. Screw conveyors 3. Bucket elevators 4. Grab bucket elevators 5. Skip hoists 6. Flight conveyors.

The coal transfer starts by carrying of coal from unloading point to the storage site.

5 **Write about classification of draught?**

Draught is classified as

1. Natural draught
2. Artificial draught

The artificial draught is further classified as

- (a) Steam jet draught
- (b) Mechanical draught
- (c) Induced draught
- (d) Forced draught

6 **Define the term Natural draught and what are the advantages of natural draught system?**

The tall chimney creates the natural draught by the temperature difference between hot

gases in the chimney and cold atmospheric air outside the chimney.

The advantages are

- No external power is required
- Air pollution is less since gases are discharged at high level.
- No maintenance cost
- Capital cost is less than artificial draught.

7 **Write about artificial draught?**

In modern power plants, the draught should be flexible to meet the fluctuating loads and it should be independent of atmospheric conditions. To achieve this, the aid of draft fans becomes must and by employing the draft fans, the height of the chimney would be reduced.

8 **Write about forced draught system?**

In this system, the blower (forced draft fan) is located at the base of the boiler near the grate. Air is forced to the furnace by forced fan and the flue gases are forced to chimney through economizer and air preheated.

9 **What are the advantages of forced draught system**

- Since the fan handles cold air, the fan size and the power required are less.
- No need of water cooled bearings because the air being handled is cold air,
- Pressure throughout the system is above atmospheric pressure so the air leakage into the furnace is reduced.
-

10 **What is the use of pulveriser and name different types of pulverising mills?**

The pulveriser is used to pulverize the coal in order to increase the surface exposure. Pulverized coal enables rapid combustion. The different types of pulverizing mills are

1. Ball mill
2. Hammer mill
3. Ball and race mill.

11 **How the ash handling system is classified?**

1. Mechanical handling system
2. Hydraulic system
3. Pneumatic system
4. Steam jet system

12 **Name different types of dust collectors?**

1. Mechanical Dust collector

Gravitational separators

Bag house dust collector

There are three types of bag house dust collector

- Open pressure type
- Closed pressure type
- Closed suction type

2. Cyclone. Separators

3. Elector Static Precipitator (ESP)

13 What is the main purpose of chimney?

The main purpose of chimney is to emit the flue gases at a considerable height to avoid nuisance to the surrounding people.

14 . Define forced draft and induced draft cooling towers

If the fan is located at the bottom of the tower and air is blown by the fan up through the descending water it is called as forced draft cooling towers

If the fan is located at the top of the tower and air enters through the louvers located on the tower's side and drawn up and discharges through the fan casing, it is called as induced draft.

15 What are the advantages of induced draft cooling tower over forced draft cooling tower?

- i. The outlet water comes in contact with the driest air and warmest water comes in contact with most humid air.
- ii. The re-circulation is seldom a problem.
- iii. The first cost is low due to the reduction in pump power consumption.

16 What is the working principle of Cooling Towers?

The hot water is sprayed from the top of the tower, while the air is made to flow from the bottom of the tower to the top. This air cools the hot water in the cooling tower. Air vaporizes a small percentage of water, there by cooling the remaining water. The air absorbs the heat and leaves at the top of the tower and cooled water leaves at the bottom and recirculated to the condenser.

17 What are the factors that affect the rate of evaporation of water in cooling towers?

Amount of water surface area exposed

- The time of exposure

- The relative velocity of air passing over the droplets
- The RH of air

The direction of airflow relative to water

18 Name different types of cooling towers?

The cooling towers are classified as follows.

(a) According to the construction of material

1. Timber - for small tower
2. Ferro concrete - for large capacity stations.
3. Multi deck concrete towers - for large steam stations
4. Metallic

(b) According to the nature of air draught-

1. Atmospheric (or) Natural draught cooling system
2. Mechanical draught cooling tower.

19 How the atmospheric (or) natural draught cooling towers- are classified?

In atmospheric (or) natural cooling towers, the natural air provides the required cooling without the use of fans. This is classified into three types.

1. Natural draft spray filled towers
2. Natural draft packed type towers.'
3. Hyperbolic cooling towers

20 How mechanical draft cooling towers are classified?

Mechanical draft cooling tower is classified into three types

1. Forced draft tower.
2. Induced draft counter flow tower
3. Induced draft cross flow tower.

21 How the dry type cooling towers are classified?

The dry type cooling towers are classified into two types 'as follows.

1. Indirect dry type (or) Heller cooling system
2. Direct dry type-cooling system

22 What are the methods to reduce the effects of particulates?

The effects of particulates can be reduced by the following methods.

- Coal cleaning
- Using improved electrostatic precipitator design
- Controlling the dust within allowable limit. This can be done by increasing the height of chimney thereby reducing the concentration

23 **What are the equipments used for ash collection?**

- Electrostatic precipitator
- Fly ash scrubbers
- Cinder catcher
- Cyclone dust collector
-

24 **What is meant by 'Desulphurisation' and name the methods adopted for desulphurisation?**

De sulphurisation of fuel is the process of reducing the sulphur content in the fuel. The following methods are adopted for desulphurization.

1. Chemical treatment
2. Forth flotation
3. Magnetic separation

UNIT III

NUCLEAR AND HYDEL POWER PLANT

1 **Define Nuclear Fission.**

An atom's nucleus can be split apart. When this is done a tremendous amount of energy is released. The energy is both heat and light energy. This energy, when let out slowly can be harnessed to generate electricity.

2 **Define Nuclear Fusion.**

Fusion means joining smaller nuclei to make a larger nucleus. The sun uses nuclear fusion of hydrogen atoms into helium atoms. This gives off heat and other radiation.

3 **Name the different components of nuclear reactor?**

1. Nuclear fuel
2. Moderator
3. Control rods
4. Reflectors
5. Reactor vessel
6. Biological shielding
7. Coolant

4 **What is the purpose of reprocessing of nuclear waste?**

The used fuel contains 96% uranium, 1% plutonium and 3% radioactive wastes. Reprocessing is used to separate the waste from the uranium and plutonium which can be recycled into new fuel. The reprocessing effectively reduces the volume of waste and limits the need to mine new supplies of uranium, so that extending the time of resources.

5 **What is Neutron life time?**

The prompt neutron lifetime, is the average time between the emission of neutrons and either their absorption in the system or their escape from the system. The term lifetime is used because the emission of a neutron is often considered its birth, and the subsequent absorption is considered its death.

6 **What is Uranium-235 chain Reactor?**

In a chain reaction, particles released by the splitting of the atom go off and strike other uranium atoms splitting those. Those particles given off split still other atoms in a chain reaction. If an least one neutron from U-235 fission strikes another nucleus and causes it to fission, Then the chain reaction will continue.

7 **List the four types of radiation associated with nuclear fission.**

1. Alpha radiation
2. Beta radiation
3. Gamma radiation
4. Neutron radiation

8 **Define Beta radiation.**

Beta radiation consists of electrons or their positively charged counterparts. This can penetrate the skin, but not very far.

9 **Define Gamma radiation.**

Gamma radiation is penetrative in a manner similar to X-rays and has similar physical properties. It can be stopped only by thick shields of lead or concrete.

10 **Define Neutron radiation.**

Neutron radiation consists of the neutrons emitted during the fission process. Neutrons are also very penetrative, but less so than gamma-radiation.

11 **Define water as moderator.**

Neutrons from fission have very high speeds and must slow greatly by water moderation to maintain the chain reaction. The Uranium-235 is enriched to 2.5-3.5% to allow ordinary water to be the moderator. Enough spontaneous events occur to initiate a chain reaction if the proper moderation and fuel density is provided.

12 **List the various widespread power plant reactor types.**

1. Pressurized water reactor (PWR)
2. Boiling water reactor (BWR)
3. Pressurized Heavy water reactor (PHWR)
4. Liquid metal fast Breeder Reactors (LMFBR)
5. High temperature Gas cooled reactors (HTGCR)

13 **What are pressurized water reactors (PWR)?**

The PWR belongs to the light water type. The moderator and the coolant are both light water (H₂O). The cooling water circulates in two loops, which are fully separated from one another. PWR keep water under pressure, so the water heats but does not boil even at the high operating temperature.

14 **What is boiling water reactor (BWR)?**

In a boiling water reactor, Light water plays the role of moderator and coolant as well. Part of the water boils away in the reactor pressure vessel, thus a mixture of water and steam leaves the reactor core.

15 **What is Molten Salt Reactor (MSR)?**

A molten salt reactor is a type of nuclear reactor where the primary coolant is a molten salt. Molten salt refers to a salt that is in the liquid phase that is normally a solid at standard temperature ionic liquid, although technically molten salts are a class of ionic liquids.

16 Nuclear Power plant safety.

Radiation doses can be controlled through the following procedures:

1. The handling of equipment via remote in the core of the reactor
2. Physical shielding
3. Limit on the time a worker spends in areas with significant radiation levels
4. Monitoring of individual doses and of the working environment
5. Safety mechanism of a Nuclear power reactor

17 List the Nuclear power plants in India.

1. Kaiga(3*22MWPWR), Karnataka
2. Kakrapar (2*22MWPWR), Gujarat
3. Kudankulam (2*100MWPWR), Tamilnadu
4. Madras (2*17MWPWR), Tamilnadu

18 Define mean generation time.

It is the average time from a neutron emission to a capture results in fission. The mean generation time is different from prompt neutron lifetime because the mean generation time only includes neutron absorption that leads to fission reaction.

19 State some advantages of Pressurized Water reactor?

- The pressurized water reactor is compact
- In this type, water is used as coolant, moderator and reflector water is cheap and available in plenty)

It requires less number of control rods

UNIT IV**DIESEL AND GAS POWER PLANT**

- List the advantages of gas turbine power plant.
- 1
 1. Low capital cost
 2. High reliability
 3. Flexibility in operation
 4. Capability to quick start
 5. High efficiency etc..,
 - 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 power plant
 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 cracking
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. Thermosipon cooling
 2. Forced cooling by pump
 3. Thermostat cooling
 4. Pressurized 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

- 21 Define mean effective pressure as applied to gas power cycles. How it is related to indicated power of an I.C engine

Mean effective pressure is defined as the constant pressure acting on the piston during the working stroke. It is also defined as the ratio of work done to the stroke volume or piston displacement volume

- 22 Mention the various process of the Brayton cycle

1. Isentropic compression
2. Constant pressure heat supplied
3. Isentropic expansion
4. Constant pressure heat rejection

- 23 What is the principle of operation of simple jet propulsion system?

When the work output of the gas turbine plant is used to produce high velocity jet of hot gases and this jet is used to propel the vehicles in which the system are mounted such systems are kept as jet propulsion systems.

UNIT V
OTHER POWER PLANTS AND ECONOMICS OF POWER PLANTS

1 What are the components of solar energy?

1. Collector
2. Storage unit

2 Define demand factor?

- Demand factor is defined as the ratio of maximum demand to connected load.
- Connected load is the sum of ratings in kW of equipment installed in the consumer's premises.
- Maximum demand is the maximum load, which a consumer uses at any time.

3 Define load curve?

Load curve is a graphical representation between load in kW and time in hours. It shows variation of load at the power station. The area under the load curve represents the energy generated in a particular period.

4 Define load factor?

Load factor is defined as the ratio of average load to the peak load (or) maximum demand.

5 What includes fixed cost?

Fixed cost includes the following cost.

- | | |
|----------------------|-------------------------|
| 1. Cost of land | 2. Cost of building |
| 3. Cost of equipment | 4. Cost of installation |
| 5. Interest | 6. Depreciation cost |
| 7. Insurance | 8. Management cost |

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7 What includes operating cost?

Operating cost includes the following cost.

1. Cost of fuel
2. Cost of operating labour,
3. Cost of maintenance labours and materials.
4. Cost of supplier like
 - Water for feeding boilers, for condenser and for general use.
 - Lubrication oil and, grease.
 - Water treatment chemicals.

8 What is the need of depreciation cost?

Depreciation cost is the amount to be set aside per year from the income of the plant to meet the depreciation caused by the age of service, wear and tear of the machinery and equipments. Depreciation amount collected every year helps in replacing and repairing the equipment.

9 What is concentration ratio?

Concentration ratio is defined as the ratio between the aperture area and the receiver Absorber area of the collector.

10 List the various types of solar energy collectors.

1. Stationary collectors (or) Non- concentrating
 - (a) Flat plate collectors
 - (b) Compound parabolic collectors
 - (c) Evacuated tube collectors
2. Sun tracking concentrating collector
 - (a) single axis tracking
 - (b) Two-axis tracking

11 List any four applications of solar collectors.

1. Solar water heating
2. Solar space heating systems
3. Solar refrigeration
4. Industrial process heat systems

12 List the four important solar systems.

1. Low temperature cycles using flat plate collector or solar pond
2. Power tower or central receiver system
3. Distributed collector system
4. Concentrating collectors for medium and high temperature cycle

- 13 **List the advantages of solar Energy.**
- 1.Solar energy is free from pollution
 - 2.They collect solar energy optically and transfer it to a single receiver, thus minimizing thermal-energy transport requirements
 3. They typically achieve concentration ratios of 300 to 1500 and so are highly Efficient both in collecting energy and converting it to electricity.
 - 4.The plant requires little maintenance or help after setup
 5. It is economical
- 14 **List any four disadvantages of solar energy.**
- 1.Available in day time only
 - 2.Need storage facilities
 - 3.It needs a backup power plant
 - 4.Keeping back up plants hot includes an energy cost which includes coal burning
- 15 **List the classification of OTEC based on location.**
1. Land based plant
 2. Shelf based plant
 3. Floating plant
- 16 **List the classification of OTEC based on cycle.**
- 1.Open cycle
 - 2.Closed cycle
 - 3.Hybrid cycle
- 17 **List any four disadvantages of OTEC.**
1. Degradation of heat exchanger performance as dissolved gases.
 2. Degradation of heat exchanger performance by microbial fouling
 3. Improper sealing
 4. Parasitic power consumption by exhaust compressor
- 18 **List any four benefits of OTEC.**
- 1.Airconditioning
 - 2.Chilled soil agriculture
 - 3.Aquaculture
 - 4.Desalination
- 19 **List the various components of wind energy system.**
- 1.Rotor
 - 2.Gearbox

3. Enclosure
 4. Tailvane
- 20 **What are the two basic design of turbines?**
1. Vertical axis (or) Egg beater style
 2. Horizontal axis (propeller style) machines
- 21 **Write down the various types of wind power plants.**
1. Remote
 2. Hybrid
 3. Grid connected
- 22 **List any four advantages of wind turbine.**
1. Inexhaustible fuel source
 2. No pollution
 3. Excellent supplement to other renewable source
 4. Its free
- 23 **List the disadvantages of wind power generation.**
1. Low energy production
 2. Expensive maintenance
- 24 **What are the various ways of creating tidal energy?**
1. Tidal Barrager
 2. Tidal fences
 3. Tidal turbines
- 25 **List the various types of turbines used in tidal power station.**
1. Buld turbine
 2. Rim turbine
 3. Tubular turbines
- 26 **What are the components of tidal power station?**
1. Barrage
 2. Turbines
 3. Sluices
 4. Embankments

- 27 **List any four advantages of tidal power generation.**
1. Renewable and sustainable energy
 2. No liquid or Solid pollution
 3. Little visual impact
 4. Reduces dependence upon fossil fuels
- 28 **List the limitations of tidal energy.**
1. Orientation problem
 2. Requires storage devices
 3. Available at a lower rating and time
 4. High capital cost
- 29 **What are the main parts of geothermal power plant?**
1. Production well
 2. Vaporizer
 3. Circulating pump
 4. Expansion turbine
 5. Generator
 6. Condenser
 7. Transformer
- 30 **What are the classifications of geothermal energy conversion system?**
1. Single cycle geothermal power plant
 2. Binary cycle power plant
- 31 **What are the advantages of geothermal energy?**
1. Cheaper
 2. Versatile in its use
 3. Delivers greater amount of energy
- 32 **What are the disadvantages of geothermal energy?**
1. Drilling operation is noisy
 2. It needs large areas of exploitation of geothermal energy
 3. Low overall power production efficiency.
- 33 **What are the classifications of MHD system?**
1. Open cycle systems
 2. Closed cycle systems
 - (a) Seeded inert gas systems
 - (b) Liquid metal systems

34 **What are the advantages of MHD systems?**

1. Large amount of power is generated
2. No moving parts, so more reliable.
3. Closed cycle system produces power, free of pollution
4. Ability to reach its full power as soon as started.

35 **List the classification of oil injection system.**

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

36 **List the disadvantages of MHD systems.**

1. Needs very large magnets (high expenses)
2. Very high friction and heat transfer losses
3. It suffers from the reverse flow of electrons through the conducting fluids around the ends of the magnetic field.

37 **What are the applications of geothermal energy?**

1. Generation of electric power
2. Space heating for building
3. Industrial process heat