ENERGY ENGINEERING UNIT 1

Apart from geographical location, the amount of power generated in a country depends on _____

a) Number of power producing plants
b) Annual consumption of power
c) Utilization of natural resources
d) Quantity of requirement

Answer: c

Explanation: Since most of the power produced is from the natural resources, the estimation of amount of power generated in a country is made by the utilization of its natural resources. The 'Annual consumption of power 'would give you the details of power utilized for necessities, it is the amount of power utilized out of wholesome amount of total power produced in the country.

Total power generated is usually contributed by power generated through _____

a) Hydel power plant, Thermal power plant and solar plant
b) Ocean thermal energy, Wind energy and Hydel power plant
c) Hydel power plant, Geo-thermal plant and Nuclear power plant
d) Hydel power plant, Thermal power plant and nuclear power plan

Answer: d

Explanation: The energy or power produced from hydel power plant, thermal power plant and nuclear power plant is very abundant compared to any other combinations of power producing plants. All these three plants have ability to produce the power in thousands of megawatts in its own standards.

On what factors does hydel plant entirely depend?

a) Vegetation
b) Tropical cycle
c) Amount of Rainfall
d) Hydrological cycle

Answer: d

Explanation: Hydrological cycle is an explanation of the continuous movement of water above and below earth surface, where as rainfall is not reliable since it varies period to period. The amount of water above the earth surface and below the earth surface, both are responsible for the hydrological cycle. 'Vegetation' is info about the assemblage of plant species irrespective of their geographic characteristics.

4. The steam power plant serves as a base plant for _____

a) Nuclear power plant
b) Geothermal power plant
c) Thermal power plant
d) Diesel plant

Answer: a

Explanation: Since power is generated by nuclear power plant and the nuclear plant needs power to perform its operations. For this purpose steam power plant is used as base power plant to generate this power. The power produced base plant acts as a fuel to run the

nuclear power plant. And all the cost estimation to produce the electricity is made by considering base load expenses too.

5. What is the primary objective of a steam power plant?
a) To convert one form of energy into another form
b) To produce electricity
c) To provide employment
d) To serve as a base load plant to hydel plant or nuclear plant

Answer: b
Explanation: The primary objective of the steam power plant is to produce electricity and then serving as base load plant to hydel or nuclear power plant comes as second priority. Steam power plants produce 86% of electricity. And the efficiency of steam power plant is typically 33%-48%.

6. A steam power plant works on_____cycle.
a) Otto
b) Brayton
c) Hydrological
d) Rankine
View Answer
Answer: d
Explanation: Rankine cycle is a thermodynamic cycle of constant pressure engine that is to convert heat energy into mechanical work and from that following parts like adjoined blades and shafts are made to run to produce electricity. Otto cycle is used in automobile engine and Brayton cycle is used in heat engines & air jet engine.

7. Coal crushers are also known as_____
a) Lather
b) Coal combers
c) Feeder breakers
d) Coal washer
View Answer
Answer: c
Explanation: Coal crushers are also known as feeder breakers since it is elaborated by the word itself. ‘Feeder’ depicts the following component coal being fed by the hoppers and ‘Breaker’ stands for breaking off into smaller pieces. And this synonym is rarely used.

8. Road transportation of coal is preferred for what type of usage?
a) Small capacity plant
b) Medium capacity plant
c) Large capacity plant
d) Domestic usage areas
View Answer
Answer: a
Explanation: Road transportation of coal is ideal transporting coal directly to point of consumption. These small capacity plants are usually located in the middle of land. Trucks and tippers are used to supply coal for this purpose. And also when the plant doesn’t have railway or shipway accessibility in such areas roadways are only possible means of transportation.

9. Which is the more economical way of transporting coal?
a) Sea or River ways
b) Railways
c) Road transporting
d) By Airlifting
View Answer
Answer: b
Explanation: We do know shipways are cheaper. But we need another mode of transport to transfer that coal to the plant area. But in case of railways the tracks can be made to directly pass through the plant. Hence the railway is more economical compared to any other means of transport.

10. What is the role of breaker house in coal feeding?
a) To break the coal into smaller pieces
b) To separate different sizes of coal
c) To separate the light dust from the coal
d) To powder the coal
View Answer
Answer: c
Explanation: Because of the brittle nature of the coal, it is a common nature of coal to emit light dust/coal dust during transportation, mining and machine handling. This dust needs to be cleared out and it is performed by coal breaker.

11. When coal is being burnt how much % of ash is formed compared to the whole amount?
a) 10-20%
b) 40-50%
c) 25-35%
d) 4-10%
View Answer
Answer: a
Explanation: The coal available in nature already contains some percent of ash and when it is burnt. Due to its brittle nature more amount of ash is produced. And coal is one of the largest types of industrial waste generated. For environmental benefits, this coal ash is reused as a type of by-product in different types of industries.

12. Why is it important to prefer ash handling systems?
a) Coal ash produced destroys the machinery by entering into them
b) Coal ash produced annually accounts for thousands of tones
c) Coal ash can be reutilized for some other purpose
d) Coal ash affects the health of people working at plants
View Answer
Answer: b
Explanation: Considering the large coal burning capacity plant of modern times, the amount of ash produced when the coal is burnt is in thousands of tones. It could have an effect on other subjects too if the proper ash handling methods are not followed. And for different environmental, economical and product benefits the coal ash is reused by different types of industries in different ways of its necessity.

13. Large amount of coal is transported by _____
a) railway
b) sea or river ways

c) road transportation
d) by airlifting
View Answer
Answer: a
Explanation: The railway is preferred since it is quite economical as well as loading and unloading of coal is easy. And at stretch tons of coal can be transported by goods train from one place to another place. Coal is considered as a bulk commodity value which falls in category of minerals and ores. If roadways are preferred only minimal amount of load can be transported. But by railway, long distances with huge amount of coal can transported to any region/part of the country.

14. The coal is fed to the furnace through _____
a) conveyor belt
b) wagon tipper
c) hopper
d) crane
View Answer
Answer: c
Explanation: Hopper is the conical shaped slow coal dispenser to the furnace. It is placed right above the furnace and a live feeder mechanism is set at end of hopper for a controlled flow. There is no requirement of any external power/force since this works on gravity force.

15. Which system consumes less power out of all ash handling systems?
a) Mechanical ash handling system
b) Pneumatic ash handling system
c) Hydraulic ash handling system
d) Steam jet ash handling system
View Answer
Answer: a
Explanation: The mechanical ash handling system consumes less amount of power. Since the power is required by the conveyor belt to transfer the ash from boiler furnace to over head bunker which is located at end of the conveyor belt. And in case of pneumatic there is high power requirement to draw and blow the air at high velocities and high pressures.

16. What is the function of cyclone separators in pneumatic ash handling system?
a) To separate the lighter dust particles
b) To force up the movement of ash through pipes or tubes
c) To draw out the dust from furnace
d) To separate minute coal particles
View Answer
Answer: a
Explanation: Cyclone separators use air to swirl around the ash that has been dispensed into them. Due to centrifugal action heavier ash settles down, where as lighter dust/ash particles is collected in hopper and dumped out. The air flows in helical pattern which makes easy for the heavier dust particle to settle down easily without interrupting the airflow.

17. Which medium is used to carry ash in the pneumatic ash handling system?
a) Conveyor belt
b) Water trough
c) Air

d) Chain belt

Answer: c
Explanation: In pneumatic ash handling system, Air is used to carry ash to long distance at a capacity of 5 to 30 tonnes per hour. And the air used for this purpose is easily cleanable and can be exhausted back into atmosphere after the complete filtration processes.

18. Which system is noisy out of all the following ash handling systems?
a) Steam jet ash handling system
b) Mechanical ash handling system
c) Pneumatic ash handling system
d) Hydraulic ash handling system
View Answer
Answer: c
Explanation: The air is made to pass at very high pressure in order to carry out the ash for long distance. Since the air is moving at high speed at high velocity in the conveying pipes, it tends to create a lot of noise by hitting the walls of pipe at swift turns and curves.

19. Which medium is used to carry ash in hydraulic system?
a) Air
b) Water
c) Steam
d) Conveyor
View Answer
Answer: b
Explanation: Water is used as the medium to carry ash at high velocity. Depending on water pressure the system is divided as Low pressure system and High pressure system. In low pressure system, sloped sumps are used to move the ash at low velocity and in high pressure system nozzle sprays used to ram up the speed of ash flow.

20. What would be the amount of distance that a low pressure system could carry the ash?
a) 25m
b) 500m
c) 150m
d) 800m
View Answer
Answer: b
Explanation: Low pressure system moves the ash mixed in water at a distance of 3 to 5 m/s in a sloped pump made of reinforced constituents and this movement is continuous. So, it has the ability to carry the ash for such long distance. There is no requirement any auxiliary source to move the ash mixed with water.

21. What is the capacity of low pressure hydraulic ash handling system?
a) 80 tonnes/hour
b) 22 tonnes/hour
c) 50 tonnes/hour
d) 10 tonnes/hour
View Answer
Answer: c
Explanation: The capacity of low pressure hydraulic ash handling system is 50tonnes/hour at a speed of 3m/s. Since the ash produced is mixed in water and dumped,

the water has the ability to dissolve and intake more amount of ash. And this mixture is spread throughout the sump.

22. _____is used in high pressure hydraulic ash handling system, to quench the ash.
a) Turbines
b) Lubricants
c) Water troughs
d) Nozzle sprays
View Answer
Answer: d
Explanation: As we know Nozzles are used to increase pressure. Also, they are also used to quench the ash. The ash falling from the conveyor belt is quenched to make it flow down through the sump. Water trough is used in order to avoid dust creating from falling ash from the furnace.

23. Which of the following ash handling system is more suitable for large thermal plants?
a) Steam jet ash handling system
b) Mechanical ash handling system
c) Pneumatic ash handling system
d) Hydraulic ash handling system
View Answer
Answer: d
Explanation: Hydraulic ash handling system is more suitable large thermal plants since its ash carrying capacity is considerably large. And also it has ability to dissolve the ash in the water which makes its capacity large. It also has lots of advantages it is clean, dust free and no noise is produced. The water used can be recycled only for limited amount of times.

24. What is the important feature of hydraulic ash handling system?
a) It is clean and dustless
b) It can discharge ash for long distances
c) The unhealthy aspect of ordinary ash basement work is eliminated
d) Absence of working parts in contact with ash
View Answer
Answer: d
Explanation: Particularly in hydraulic system the ash is actually quenched in water. So, there is less chance that ash has any possibility of getting in contact with the machineries. There is less chances of machine falling into a repair and maintenance is less as compared to any other type of ash handling system.

25. In hydraulic ash handling system, large quantities of leachate under a positive pressure head in pond pose a constant threat to _____
a) cause pungent smell
b) the livelihood
c) ground water quality
d) the nearby flora
View Answer
Answer: b
Explanation: Since there is constant gravity pressure that is exerting on the surface of the ponds or other water bodies where hydraulic ash is dumped. When the same water is absorbed into the ground, it affects the quality of ground water. This effect indirectly affects growth of plants and degrades the land around water body making it unusable.

26. Which of the following ash handling system is not flexible to re-locate/re-place its discharging site?
a) Steam jet ash handling system
b) Mechanical ash handling system
c) Hydraulic ash handling system
d) Pneumatic ash handling system
View Answer
Answer: c
Explanation: Since the hydraulic ash handling system involves the usage of liquids, the discharging sites cannot be re-located/re-placed. Else constructing/developing a new discharging site is possible but the old one cannot be replaced since it is a wet system. In case of all other forms of ash handling system it is easy since they are dry system and they won't have much of an impact on the following discharging site/land.

27. _____and_____are the common problems on pipeline inner walls when the slurry contains calcium, magnesium and sulphate ashes.
a) Clogs and Corrosion
b) Scaling and Cracks
c) Pores and Contamination
d) Scaling and Cementation
View Answer
Answer: d
Explanation: Scaling and Cementation are the two main problems caused on the inner walls of pipeline, when there is contamination of calcium, magnesium and sulphate in the discharge. Calcium or magnesium contained mixtures have limited solubility. So, they intend get deposited on the materials.

28. Which of the following ash is suitable for selling?
a) Bed ash
b) Synthetic gypsum
c) Fly ash
d) Clinkers
View Answer
Answer: c
Explanation: Fly ash is sold in the market, which is used in concrete bricks, cement clinkers, road subbase and as mineral filler in asphaltic concrete. Fly ash is very fine in its structure, composed mostly of silica made from burning of coal in the furnace or boiler. And 'Bed ash' refers to the ash that's struck on the walls of boiler which is very coarse in nature.

29. Which ash handling system can be built up in limited space?
a) Mechanical ash handling system
b) Pneumatic ash handling system
c) Hydraulic ash handling system
d) Steam jet ash handling system
View Answer
Answer: d
Explanation: Steam jet ash handling system can be constructed particularly when there is a limited amount of space is available because not much amount of space is required for its setup and operation. Pneumatic and hydraulic ash handling system require huge

amount of space for their construction and operation. Steam jet ash handling system is used in small capacity plants.

30. In what form does the total ash produced in the furnace escapes through the chimney?
a) Fines
b) Aerosols
c) Gas
d) Cinder
View Answer
Answer: a
Explanation: Fines are the particles which vary in the size of 1 to 80 microns. These could easily get escaped into air via chimneys. About 80% of ash produce is in this range of microns and everything gets easily escaped into air and the rest is made use for other possible purposes.

10. What is the capacity of the steam jet ash handling system?
a) 45tonnes/hour
b) 15tonnes/hour
c) 30tonnes/hour
d) 150tonnes/hour
View Answer
Answer: b
Explanation: The capacity of the steam jet ash handling system is limited 15tonnes/hour since the plant built up is in less space. And it has ability to remove ash through a horizontal distance of 200m. the operation of this system is noisy since steam jet of high velocity is produced in such a limited place.

11. What material is used in pipe linings for linking of steam jet system?
a) Nickel alloy
b) Graphite
c) Titanium
d) Copper alloy
View Answer
Answer: a
Explanation: The abrasive particles present in ash cause wear and tear in pipes due to high speed movement in pipes of steam jet system. Even chilled iron also can be used to line the pipes to overcome the following problem. And also avoiding bends and turns in pipes would reduce the damage of pipes.

12. What is the distance up to which steam jet ash handling system is capable of removing ashes?
a) 200m
b) 50m
c) 75m
d) 350m
View Answer
Answer: a
Explanation: Even though the size of the steam jet ash handling capacity is compact, the high velocity steam jet can easily remove the ashes up to 200m. Since it is small sized plant its capability to remove ashes is limited. The moisture of steam also makes the ash wet and it would gain a light amount of weight which becomes a bit difficult to move ash at a longer distances.

13. What measure to be taken to avoid the noise produced in the pneumatic ash handling system?
a) Passing ash at slower pace
b) Reducing swift turns and sharp bends
c) Broadening of pipe width
d) Reducing and crushing the size of the ash
View Answer
Answer: b
Explanation: The air and ash mixture moving through the pipe at high pressure tends to hit the walls at inner side of pipe when there are number of swift turns and sharp bends made. Avoiding them can reduce the noise up to 50%.

14. Is there any requirement of auxiliary steam producer in the steam jet ash handling system.
a) True
b) False
View Answer
Answer: b
Explanation: There is no requirement for any auxiliary steam producing unit since the steam required is drawn from the boiler present in the system. The steam drawn from the boiler is pressurized and then utilized. Non-requirement of auxiliary unit is advantageous as it would cut slack in the expenses of setting up the plant.

15. How much amount of steam is required to remove 1 ton of ash from the steam jet ash handling system?
a) 100kg
b) 450kg
c) 65kg
d) 200kg
View Answer
Answer: a
Explanation: 100 kg of steam is required to remove 1 ton of ash. Since the steam let out is at very high velocity, 1 ton of ash can be easily moved to compare and balancing to its weight ratio. And this wholesome amount of steam is generated by the boiler present in the plant.

What type of draught fan is used to draw air from the air heater?
a) Balanced draught fan
b) Induced draught fan
c) Forced draught fan
d) Artificial draught fan
View Answer
Answer: c
Explanation: Forced draught fan is used to draw the air. This is installed near the base of boiler and air is forced to pass through the furnace, economizer and to the air stack. This is also called a positive draught system because pressure and air is forced to flow through the system.

In what form are the products of combustion in steam powered plant?
a) Air products
b) Flue gas
c) Slurry

d) Hot water
View Answer
Answer: b
Explanation: The products of combustion are in form of flue gas. Flue gas is the gas which is exiting to the atmosphere via a flue, which is channel for releasing exhaust gas from steam power plant. The flue gas is high in the contamination of nitrogen, oxygen and carbon dioxide. And also it contains a small amount of pollutants, such as soot and other types of oxides.

How flue gas is made use of in steam power plant?
a) To maintain the constant pressure inside boiler
b) To heat the water in the tubes of boiler
c) To increase or decrease the pressure inside the boiler
d) To remove all unnecessary chemical constituents
View Answer
Answer: b
Explanation: The flue gases are circulated in the furnace to heat the water in tubes. First it is passed over economizer and then to the pre-heater. And then finally after making maximum utilization of the flue gas they are exhausted through chimneys.

How is flue gas discharged through the chimneys?
a) By using induced draught fan
b) By using balanced draught fan
c) By using forced draught fan
d) By using mechanical draught fan
View Answer
Answer: a
Explanation: After extracting maximum possible heat by circulating the flue gas in furnace. Induce draught fan is used to remove the left over gas via chimney. This is located near the base of the chimney. The air is sucked in by reducing the pressure below atmosphere. The draught produced is independent of temperature of hot gases.

What is the purpose of chimney?
a) To provide air ventilation
b) To eliminate noise produced in the system
c) To exhaust flue gases those is induced
d) To help in to suck the air required for system
View Answer
Answer: c
Explanation: Chimneys are actually used to remove exhaust gases or products of combustion by using induced draught system. Almost all chimneys are constructed by bricks vertically and at a certain height in order easily release flue gases into atmosphere. The height of the chimneys shows its ability to transfer flue gases. The deposits of flue gas contaminations are made on the inner walls of the chimney.

What is the advantage of using flue gas inside a boiler?
a) Heats up boiler water tube quickly
b) Reduces the amount of amount of exhaust
c) Speeds of the process of boiler
d) Reduces the green house of effect
View Answer

Answer: d
Explanation: Using flue gas to heat up the water tubes reduces the greenhouse effect indirectly by making use of its heat to turn the water in water tubes into steam. This will be used in steam power plant to rotate the turbine and to produce electricity. And also plant operators can operate at best heat rate efficiency.

How is water pumped into condenser tubes in the steam power plant?
a) Water clarifier plant
b) Draught systems
c) Hydraulic capacity electric motor pump
d) Drawing through water
View Answer
Answer: a
Explanation: The water is pumped into condenser tubes through water clarifier plant. Clarifier helps in suspending solids from water in order to avoid damages to condenser tubes. Clarifiers are available in wide varieties of capacities of capacities and shapes depending on the steam plant.

When is the cooling tower preferred?
a) When there is plenty of water available
b) When there is scarcity of water
c) When the plant is of large capacity
d) When the amount of flue gas produced is very high
View Answer
Answer: b
Explanation: Cooling tower is preferred when there is scarcity of water. Instead of circulating the water directly, it is sprinkled in the cooling tower to condense the exhausted steam coming from the turbine. The loss of water due to evaporation is compensated by supplying water directly from the river.

What type of system is it, when the water is directly is used to condense the steam?
a) Closed system
b) Open system
c) Closed loop system
d) Open loop system
View Answer
Answer: b
Explanation: Water is pumped through the water clarifier plant and is used to circulate through the condenser in order to condense the steam coming out from the turbine. Water leaving the condenser is discharged to the downward side of the river. The amount of water in taken from river, the same amount of water is discharged back to river with the minimal temperature difference. And this following system is called open system.

How is the amount of cooling required by the steam power plant determined?
a) By the capacity of plant
b) By the amount of exhausted gas
c) By its thermal efficiency
d) By the type of fuel used (coal or uranium)
View Answer
Answer: c
Explanation: The amount of cooling required by the steam power plant is determined by its thermal efficiency. It has nothing to do whether it is fueled by coal or uranium; neither

has it depended on the type of power plant (nuclear, thermal or hydel). Nuclear power plants have lower thermal efficiency than thermal plants. Higher the thermal plants lower the water usage for cooling.

How much amount of water does typical 1GWe plant uses for cooling per day?
a) 30 mega litre
b) 45 mega litre
c) 55 mega litre
d) 75 mega litre
View Answer
Answer: d
Explanation: Water is used in a plant to convert it into steam and utilize it for developing mechanical energy as well as it is used for the cooling of the steam produced. This water is supplied by the large water bodies like river or big lakes. The amount of utilized from water body is all discharged back at the end.

What type of system is it when the cooling tower is preferred?
a) Closed system
b) Open system
c) Closed loop system
d) Open loop system
View Answer
Answer: a
Explanation: When there is a scarcity of water a cooling tower is installed, such system is known as the closed system. In this system the condensed water is cooled by passing it through the cooling tower and water is sprinkled over steam. The loss of water due to evaporation is compensated by supply of water directly from the river.

What is the alternative cooling method for the thermal plant?
a) Wet cooling
b) Evaporation cooling
c) Dry cooling
d) Central air damping
View Answer
Answer: c
Explanation: The alternative way of cooling method is dry cooling. Where in this method the heat is directly transferred to air via high flow forced drafts [industrial sized fans]. This is less efficient compared to wet cooling method since it uses very high amount of power to rotate the fans. Dry cooling method is very useful in the desert areas, where water scarcity is a huge problem.

How can we achieve high thermal efficiency in a power plant?
a) Drawing high output with limited input
b) Decreasing the working temperature
c) Increasing the working temperature
d) Maintain large temperature differential
View Answer
Answer: d
Explanation: The amount of heat discharged to environment depends on the plants thermal efficiency. High efficiency is achieved by having a large temperature differential. Irrespective of whether it comes from high internal heat or low temperature external environment, or both. The thermal efficiency of today’s nuclear power plant is around

35% whereas hotter coal burners can reach 40% or more. At last higher thermal efficiency is required to lower the water usage.

What is the storage used to hold the condensed water?
a) Reservoir
b) Tarn
c) Hot well
d) Basin
View Answer
Answer: c
Explanation: Hot well is used for storage of the condensed water in a power plant. A tank or reservoir in which hot water is collected before being recirculated, especially condensed steam about to be returned to a boiler is called Hot well.

Feed water from the hot well is supplied to steam generator by using the _____
a) Sewers
b) Cistern
c) Water trough
d) Feed pump
View Answer
Answer: d
Explanation: Feed pump is used to pump/supply feed water from hot wall to steam generator. The water may be freshly supplied or returned condensate produced by the boiler. These pumps are positive displacement generator and are of very high capacity.

Super heater tubes are made up of what type of material?
a) Copper alloy
b) Carbon steel
c) Titanium alloy
d) Iron
View Answer
Answer: b
Explanation: The steam generated in the boiler is superheated in super heater tubes made of carbon steel for operating at a steam temperature of up to 950°F and carbon molybdenum steel for operating at steam temperature of 1050°F and stainless steel for operating temperature of 1200°F. The tubes of super heater have an outside diameter which ranges from 25mm to 64mm.

By what means the power in the steam power plant is developed?
a) Condenser
b) Electric power system
c) Prime mover
d) Economizer
View Answer
Answer: c
Explanation: The prime move s used to develop power in the steam power plant. The water is heated, turns into steam and is made to enter into steam turbine. The steam spins and it drives electric generator connected to it, which generates electricity.

Chemicals are added in the feed water.
a) True

b) False
View Answer
Answer: a
Explanation: Chemicals are put into feed water through the chemical feed tank to keep water within chemical range. These chemicals are mostly oxygen scavengers and phosphates. The boiler water also has frequent blow downs in order to keep the chloride content down.

What is the main objective beyond treating feed water?
a) To remove solid particle
b) To prevent damage by scaling
c) To speed up the steaming process
d) To control conductivity
View Answer
Answer: b
Explanation: The main objective to treat feed water is to prevent damage by scaling and exchange heat without scaling to produce high quality steam. Since a high amount of water is converted into steam back and forth, there is pretty good chance of scale formation in the tubes if the water is not treated.

What is the pH value at which the boiler is alkalized?
a) 9.0
b) 5.4
c) 6.9
d) 5.7
View Answer
Answer: a
Explanation: The boiler is alkalized to pH value of 9.0 to reduce oxidization and to support the formation of a stable layer of magnetite on water side surface of the boiler protecting from oxidation. And also oxygen scavengers are used to remove residues of oxides, especially O_2 & CO_2 [oxygen and carbon dioxide] must be removed. Sodium hydroxide or ammonia is used for alkalization of the feed water.

What does steam power plant mainly use to generate steam?
a) Boiled water
b) Fresh steam
c) Flue gas
d) Condensed water
View Answer
Answer: c
Explanation: Steam power mainly uses hot products of combustion known as flue gas to generate steam in a boiler. Heat is generated by burning coal, oil or gas. For this purpose boiler furnace is designed for firing coal, air or gas. The flue gas is exhausted via chimney after making maximum utilization of it.

What type of steam is produced in the steam boiler?
a) Low pressure steam
b) High pressure steam
c) Saturated steam
d) Unsaturated steam
View Answer

Answer: c
Explanation: The boiler is an integral component of steam engine. A boiler incorporates a firebox or furnace in order to burn the fuel and generate heat. The generated heat is transferred to water to make steam. This produced saturated steam at a rate which can vary according to pressure. The saturated steam thus can produced can either be used immediately to produce power via turbine.

What is the main purpose of using an economizer in a boiler?
a) To control the process of steam conversion
b) To reduce energy consumption
c) To increase the temperature of boiler
d) To maintain a constant temperature inside a boiler
View Answer
Answer: a
Explanation: Economizer in boilers is used to heat fluids, upto a certain degree not beyond the boiling point of that fluid. Economizers are named so because they can make use of enthalpy in fluid stream that are hot, thereby making more useful enthalpy and improving the boiler's efficiency.

In what form is the coal used in boiler?
a) Big chunks.
b) Medium size crushed
c) Powder form
d) Mixed with fluid
View Answer
Answer: c
Explanation: The coal used for boiler is in powder form, in order to increase thermal efficiency. The different types of coal used in boiler are generally bituminous coal, brown coal and peat. Commonly bituminous coal is most preferred boiler fuel since it has volatile matter from 8 to 33% and ash content of 5 to 16 %.

Why is air pre-heater used in the boiler?
a) To draw in the atmospheric air
b) To increase thermal efficiency
c) To heat the air to superheated level
d) To heat the air in advance
View Answer
Answer: b
Explanation: the purpose of the air preheater is to recover the heat from the boiler flue gas which increases the thermal efficiency of the boiler by reducing the useful heat lost in the flue gas. As a consequence the flue gases are also conveyed to the flue gas struck at a lower temperature, allowing simplified design of conveyance system and flue gas stack.

What is the advantage of condensing the steam?
a) To cool down the steam
b) To discharge the same amount of feed water taken
c) Reduces the amount of pollution
d) Reduces the amount of fresh feed water
View Answer
Answer: d
Explanation: The principle advantage of condensing operation is to reduce the amount of fresh feed water. A condenser is usually installed after the turbine to convert the exhaust

steam from the turbine. They convert gaseous steam into liquid state, at a pressure below atmospheric temperature. Condensing of steam turbine below the atmospheric temperature, the steam pressure drops between the inlet and exhaust of turbine is increased, which increases amount of heat available.

How is water dispensed over to the turbine blades?
a) Trough
b) Nozzle
c) Hose
d) Pump
View Answer
Answer: b
Explanation: Nozzle is used to dispense the water over to the turbine blades of steam turbine. A nozzle is a duct that increases the velocity of the flowing fluid at the expense of pressure drop. It's a duct which decreases the velocity of fluid and increases pressure difference.

In what aspect does the nozzle make changes?
a) Temperature
b) Volume
c) Pressure
d) Density
View Answer
Answer: c
Explanation: Nozzle makes changes in terms of pressure variation. And rest all factors/terms are unaffected. By decreasing the pressure and increasing the velocity at other end through convergent-divergent nozzle, the required force or pace can be achieved to run the blades of turbine.

In presence of which gas is the fuel burnt to generate energy in the form of heat?
a) Oxygen
b) Hydrogen
c) Methane
d) Nitrogen
View Answer
Answer: a
Explanation: The fuel is burnt in the presence of oxygen to generate energy in the form of heat. This heat energy can be used for electrical power generation in steam power plants and for propelling ships, automobiles and locomotives, etc.

Which are the main constituents of fuel from given options?
a) Carbon and Nitrogen
b) Oxygen and Hydrogen
c) Carbon and Hydrogen
d) Helium and Oxygen
View Answer
Answer: c
Explanation: Carbon and Hydrogen are the main constituents of a fuel. In addition to them, fuel also contains sulfur, oxygen and nitrogen in minimal quantities. Depending on the fuel, the percentage of carbon ranges from 50-95%, hydrogen (H_2) 2-6%, oxygen (O_2) 2-4%, sulfur (S_2) 0.5-3% and Nitrogen (N) 5-7%. A solid fuel may also contain 2-30% ash. In a fuel carbon, hydrogen and sulfur are combustible elements whereas nitrogen and

ash are incombustible elements. Since the major combustible elements in fuel are carbon and hydrogen it can also be called as Hydrocarbon fuel.

Which fuel is used widely in steam power plants?
a) Oil
b) Gas
c) Coal
d) Petroleum
View Answer
Answer: c
Explanation: Coal is the oldest form of fuel and is still used in a large scale throughout the world by steam power plants as well as all power generation plants. Coal is a heterogeneous compound and its constituents are always carbon, hydrogen, oxygen, sulfur, nitrogen and certain mineral non combustibles.

What is the phenomenon of the formation of coal called?
a) Metamorphism
b) Diagenis'
c) Photosynthesis
d) Protolith
View Answer
Answer: a
Explanation: The phenomenon by which the buried vegetation consisting wood, grass, shrubs etc, transformed into coal is known as metamorphism. The nature of coal will depend upon the type of vegetation buried and nature and duration of metamorphism. There are different types of metamorphism namely contact metamorphism, regional metamorphism, cataclastic metamorphism, hydrothermal metamorphism, burial metamorphism and shock metamorphism.

On what basis is the coal classified?
a) Period of formation
b) Depending on capacity to burn
c) Region/area where is it formed
d) Physical and chemical composition
View Answer
Answer: d
Explanation: The coal is classified on the basis of its physical and chemical composition. The proximate and ultimate analyses are the common tests which are used to find the commercial value of the coal. The proximate analysis gives characteristics of coal such as percentage of moisture, ash and volatile matter. Analysis of coal gives an indication about fusion temperature and heating value of the coal.

What is the use of electrostatic precipitations in steam power plant?
a) To remove the steam
b) To draw the coal powder into boiler
c) To remove the feed water
d) To remove fly ash
View Answer
Answer: d
Explanation: The electrostatic precipitators are extensively used in the steam power plant for removal of fly ash from the electric utility boiler emission. Since the water inside the boiler is converted into steam, the fire for converting is fuelled by burning the coal which

produces high amount of fly ash, so that the ash' can be reused. The use of electrostatic precipitators is growing rapidly because of the new strict air code and environmental laws. An electrostatic can be designed to operate at any desired efficiency.

Why is 'make-up water' added to drum continuously?
a) To remove the impurities in tube
b) To replace the water that has been converted into steam
c) To keep the system cool externally
d) To compensate for water loss trough blow down
View Answer
Answer: d
Explanation: Make-up water is added to compensate for the losses of water incurred by blow downs or leakages occurring in boiler, and also to maintain desired water level in boiler steam drum. Blow down and leakages are common since there is continuous flow of condensate from condenser to boiler.

What causes failure of boiler tube?
a) Heating the tubes, when desired water level is not maintained
b) Induced pressure in the water
c) Over use of boiler
d) Hardness of water
View Answer
Answer: d
Explanation: Hardness of water causes failure of boiler tube. Hard water consists of calcium and magnesium salts. Hardness in water will form deposits on the tube water surfaces which will lead to overheating and failure of tubes. Thus the salts have to be removed from the water.

Fuels are classified as primary and secondary fuel based on the _____
a) Capacity to burn
b) Availability
c) State
d) Occurrence
View Answer
Answer: d
Explanation: Based on the occurrence, fuels are classified as primary fuels and secondary fuels. A primary fuel is available in nature E.g., wood, peat, lignite, natural gas, petroleum, etc. A primary fuel is also called as a natural fuel. A secondary fuel is not available in nature, but it is prepared from primary fuel by artificial means e.g. gasoline, diesel, coke gas, blast furnace gas, kerosene etc. A secondary fuel is also known as artificial fuel.

Which fuel is partially carbonized and is considered as a primary stage in coal formation?
a) Coal bitumen
b) Anthracite
c) Peat
d) Lignite
View Answer
Answer: c
Explanation: Peat is partially carbonized and decomposed material formed mainly due the transformation of buried vegetation. It is considered as the primary stage in the formation of the coal. It is spongy substance with high moisture content (upto 80%). Hence it has to

be dried before use. In dry form, it has a calorific value of about 14560 KJ/kg. It consists of 58% C; 6.3% H_2; 30.8% O_2; 0.9% N_2 and 4% ash.

Which fuel is called secondary stage in the formation of coal?
a) Lignite
b) Bituminous coal
c) Peat
d) Anthracite
View Answer
Answer: a
Explanation: Lignite is the secondary stage in the formation of coal. It is brown in color and hence known as brown coal. It is used as a low grade fuel especially for domestic use and also as a boiler fuel. It is the intermediate stage between bituminous coal and peat. It has a calorific value of about 12500 kJ/kg. It consists of 66% C; 5% H_2; 20% O_2; 1% N_2; 1% S and 3.5% ash and other incombustible.

Which fuel is commonly available in both caking and Non-caking forms?
a) Lignite
b) Bituminous coal
c) Peat
d) Anthracite
View Answer
Answer: b
Explanation: Bituminous coal is the most commonly used form of coal. It is available in both caking and non-caking forms. It burns with a yellow flame. It has calorific value of about 32000 kJ/kg. It consists of 81%C; 5%H_2; 8% O_2; 1.5% N_2; 1% S; and 3.5% ash. Caking bituminous coal softens and forms a pasty mass if heated at higher temperature. This coal is used to manufacture coke. Non-caking bituminous coal doesn't soften on heating and hence it is used in steam power plants.

Which fuel is the final stage in the formation of coal?
a) Bituminous coal
b) Anthracite coal
c) Peat
d) Lignite
View Answer
Answer: b
Explanation: Anthracite coal is called final stage of transformation of buried vegetation into coal. It is non-caking and has highest calorific value of about 35500 kJ/kg. It burns at high temperature and is smokeless. It consists of 91% C; 3% H_2; 2.5% O_2; 0.5% N_2; 0.5% S and 2.5% ash. It is also used as a boiler fuel.

Which form of fuel is used as a domestic form of fuel?
a) Wood
b) Bituminous Coal
c) Dung cake
d) Anthracite coal
View Answer
Answer: a
Explanation: wood is mainly used as a domestic fuel. It has low calorific value of about 10500 kJ/kg. It consists of about 48.5% C; 6% H_2; 1.5% of ash; 43.5% O_2 and 0.5% N_2. Wood fuel is used in different forms such as firewood, charcoal, chips, sheets, pellets and

sawdust. The particular form used depends upon factors such as source, quantity, quality and application.

What is the main purpose of demineralization treatment plant?
a) To remove deposits made on tube
b) To reduce scaling on tube
c) To remove salts
d) To filter the boiler water
View Answer
Answer: c
Explanation: The salts (calcium and magnesium) of hard water have to be removed to overcome all types of effects caused by water on tubes. Demineralization treatment plant generally consists of cation, anion and mixed bed exchangers. These ions are recombined with water to form pure water. Very pure mineralized water becomes highly corrosive once it absorbs oxygen.

What type of gear mechanism is provided to rotate the turbine generator shaft?
a) Mutilated gear mechanism
b) Ratchet gear mechanism
c) Barring gear mechanism
d) Planetary gear mechanism
View Answer
Answer: c
Explanation: Barring gear is the mechanism provided to rotate the turbine generator shaft at very low speed after unit stoppages. Once the steam inlet valve is closed, the turbine comes down towards standstill. When it stops completely, there is a tendency for turbine shaft to deflect or bend if allowed to remain in same position for too long.

Which gas cooling is used in large generator units of steam plant?
a) Sulfur dioxide
b) Hydrogen
c) Carbon dioxide
d) Nitrogen
View Answer
Answer: b
Explanation: Hydrogen gas cooling is used for large generator units in steam plant. Because it has the highest heat transfer coefficient of any known heat transfer coefficient of any gas and for its low viscosity which reduces wind-age losses. This system requires special handling during start up, with air in the generator enclosure first displaced by carbon dioxide before filling with hydrogen. This ensures that the highly flammable hydrogen does not mix with oxygen in the air.

Which fuel is produced by slow pyrolysis?
a) Dung cake
b) Coke
c) Charcoal
d) Briquette
View Answer
Answer: c
Explanation: Charcoal is produced by slow pyrolysis. It is prepared by heating wood with limited supply of air below 280°C. It contains 80-90% of carbon. It is used for domestic purpose namely cooking, heating and metallurgical purpose. Charcoal is the light weight

black carbon and ash residue produced by removing water and other volatile constituents from animal and vegetation substances. There are different types of coal namely sugar charcoal, activated charcoal, lump charcoal, etc.

Which fuel is prepared by heating bituminous coal continuously for 15 to 18 hours in closed chamber?
a) Charcoal
b) Anthracite
c) Coke
d) Briquette coal
View Answer
Answer: c
Explanation: Coal is prepared by heating bituminous coal continuously for 15 to 18 hours in closed chamber in the absence of air 500ºC to 700ºC. During this process the volatile matter is removed from the coal, leaving a dull black color to coke. It is a hard porous structure and smokeless. It contains 85 to 95% carbon. When the bituminous coal is heated between 900ºC to 1000ºC, hard coke is produced. It is used in gas producing plants and blast furnaces.

Which fuel is prepared by moulding finely ground coal under pressure?
a) Coke
b) Charcoal
c) Briquette coal
d) Lignite
View Answer
Answer: c
Explanation: Briquette coal is prepared by moulding finely ground coal under pressure with or without the addition of binding material. Most commonly used binding materials are coal tar, crude oil and clay. By using briquette coal, the fuel loss through boiler grates can be avoided.

Which fuel is produced by powdering low grade coal with high ash content?
a) Coke
b) Pulverized coal
c) Charcoal
d) Briquette coal
View Answer
Answer: b
Explanation: Pulverized coal is prepared by powdering low grade coal with high ash content. Dry coal is pulverized in pulverizing mills. It burns most efficiently when mixed with air and hence it is used in most of the power plants.

Which is the correct advantage of solid fuels out of the given option?
a) They have low ignition temperature
b) They produce small amount of smoke
c) They have higher calorific value
d) They do not form any clinker
View Answer
Answer: a
Explanation: They have low ignition temperature’. Ignition temperature is the minimum temperature at which a substance starts to burn. Different fuels have different ignition temperature. Some fuels have low ignition temperature and some have high ignition

temperature. The fuels that have low ignition temperature are highly inflammable and burn quickly at the spark of fire. While some fuels that have high ignition temperature do not burn quickly. They require heating to burn. For e.g., kerosene oil does not burn unless it is heated up to its ignition temperature.

Choose the proper disadvantage of solid fuels out of the given option?
a) They produce lot of smoke
b) They have low ignition temperature
c) They are high in production cost
d) They cannot be easily transported
View Answer
Answer: a
Explanation: Solid fuels tend to produce lot of smoke because they have large percentage of ash content. They are also brittle in nature and they contain some amount of ash in it when they are in ground. Due to their brittleness, it is common nature of solid fuels that they break into pieces while mining and transporting and form ash.

In what forms are liquid fuels available in nature?
a) Light distillate
b) Petroleum spirit
c) Petroleum naphtha
d) Crude petroleum
View Answer
Answer: d
Explanation: Liquid fuels are available in nature in the form of crude petroleum. All commercial liquid fuels are derived from crude petroleum or crude oil. The crude oil, as it comes out from oil wells contains 83-87% carbon, 10-14% hydrogen and small percentages of sulfur, nitrogen, oxygen and gases containing mainly ethane and methane.

Name the process used to eliminate impurities present in crude oil?
a) Distillation
b) Filtration
c) Sedimentation
d) Coagulation
View Answer
Answer: a
Explanation: The impurities present in the crude oil are eliminated by the process of refining oil by distillation. It is based on the principle that boiling points of various hydrocarbons increase with an increase in molecular weight and when distilled, the crude oil is separated into gasoline, kerosene, fuel oil or reduced crude oil.

Which fuel has the lightest liquid petroleum fraction?
a) Diesel
b) Petrol
c) Distillate
d) Kerosene
View Answer
Answer: b
Explanation: Petrol has the lightest liquid petroleum fraction and highly volatile in nature. It is also called gasoline. It has a specific gravity ranging from 0.70 to 0.78. It is obtained between 65 to 200^{o}C and it is a mixture of a number of hydrocarbons. It is light yellow in color and it is used as a fuel in automobiles and aero planes.

Which fuel is heavier than petrol but less volatile and it is commonly used as domestic fuel?
a) Diesel
b) Distilled fuel
c) Kerosene
d) Alcohol
View Answer
Answer: c
Explanation: Kerosene is heavier than gasoline but less volatile than it. It has a specific gravity ranging from 0.78 to 0.85. It is obtained between 150 to 300^{o}C. It is mainly used in aviation gas turbines as jet fuel and also in lams and stoves. It is miscible in petroleum solvents but immiscible in water.

Which fuel is slightly heavier than kerosene and is produced in petroleum fractions?
a) Diesel
b) Crude oil
c) Gasoline
d) Distillate
View Answer
Answer: d
Explanation: Distillate is slightly heavier than kerosene and is used as fuel and domestic fuel. It is liquid fuel usually distilled from crude petroleum and produced in fractions. Distillate fuel is a type of fuel for internal combustion vehicles with either mechanical transmissions or electric transmissions. They are used in automobiles locomotives and agricultural machinery as well as space heaters and power generators.

Which fuel has higher thermodynamic efficiency in liquid fuels?
a) Diesel
b) Petrol
c) Kerosene
d) LPG
View Answer
Answer: a
Explanation: Diesel is heavier than kerosene. It has specific gravity ranging from 0.86 to 0.95. It is obtained between 200 to 370^{o}C. It is used in diesel engine. Diesel engines have found broad use as a result of higher thermodynamic efficiency and fuel efficiency.

Which liquid fuel has a wider composition than diesel and used in furnaces of oil fired boiler?
a) Fuel oil
b) Petrol
c) Distillate
d) Alcohol
View Answer
Answer: a
Explanation: Fuel oil is similar to diesel but has wider composition than diesel. It is used in furnaces of oil fired boilers. Broadly speaking, fuel oil is any liquid fuel that is burned in furnace or boiler for the generation of power, except oil is having a flash point of approximately 42^{o}C and oils burned in cotton or wool-wick burners.

Which is the artificial liquid fuel obtained by fermentation process?
a) Fuel oil

b) Alcohol
c) Distillate
d) Kerosene
View Answer
Answer: b
Explanation: Alcohol is an artificial fuel obtained from vegetable matter by fermentation process. It is used in many chemical processes. The first four aliphatic alcohols (methanol, propanol, ethanol and butanol) are of interest as fuels because they can be synthesized chemically or biologically. The general chemical formula for alcohol fuel is $C_nH_{2n+1}OH$.

Which among the following fuels need excess amount of air for complete combustion?
a) Natural fuels
b) Liquid fuels
c) Gaseous fuels
d) Artificial solid fuels
View Answer
Answer: d
Explanation: Artificial solid fuels need excess amount of air for complete combustion because they have low calorific value compared to liquid fuels and the rate of combustion of solid fuels cannot be easily controlled. They have tendency to form clinkers at high temperatures.

Which fuels are either natural or artificial fuels?
a) Gaseous fuels
b) Solid fuels
c) Liquid fuels
d) Nuclear fuels
View Answer
Answer: a
Explanation: Gaseous fuels are either natural fuels or artificial fuels. Natural fuels occur in the form of natural gas near oil bearing areas under earth's surface. Artificial fuels prepared are coal gas coke oven gas, blast furnace gas, producer gas, water gas and mond gas.

Which gaseous fuel is found dissolved in petroleum under earth's surface in oil and gas bearing areas?
a) Natural gas
b) Coal gas
c) Mond gas
d) Producer gas
View Answer
Answer: a
Explanation: Natural gas is found dissolved in petroleum under earth's surface in oil and gas bearing areas. It mainly contains 85% Methane (CH_4) and hydrogen (H_2) along with small percentages of ethane and ethylene. Liquefied petroleum gas (LPG) is a mixture of propane, butane and other hydrocarbons separated from natural gas. It is stored under pressure in the liquid form. It is used as a domestic fuel and as an automobile fuel.

Which gaseous fuel is called as town gas?
a) Natural gas
b) Coke oven gas

c) Coal gas
d) Mond gas
View Answer
Answer: c
Explanation: Coal gas is called as town gas. It is a by-product obtained during destructive distillation of coal. It mainly contains H_2, CO, CO_2, CH_4 and N_2. It has a calorific value ranging from 21000KJ/m^3 to 25000KJ/m^3. The gas obtained when coal is heated strongly in the absence of air is called coal gas.

Which gaseous fuel is obtained by carbonization of bituminous coal?
a) Blast furnace gas
b) Coal gas
c) Producer gas
d) Coke oven gas
View Answer
Answer: d
Explanation: Coke oven gas is a fuel gas having a medium calorific value that is produced during the manufacture of metallurgical coke by heating bituminous coal to temperatures of 900^{o}C to 1000^{o}C in a chamber from which air is excluded. The main constituents are 50% H_2, 30% methane and 3% higher hydrocarbons, 7% CO, 3% CO_2 and 7% N_2. The gas has heating value of about 20,000 KJ/m^3.

Which gaseous fuel has a very low heating value?
a) Blast furnace gas
b) Coke oven gas
c) Water gas
d) Mond gas
View Answer
Answer: a
Explanation: Blast furnace has a very low heating value. It is obtained as a by-product during blast furnace operation. Due to high percentage of dust content it should be purified before use. It has a calorific value ranging between 3800 KJ/m^3 to 4200 kJ/m^3. It is used as a fuel in gas engines in steam generation and in steel plants.

Which gaseous fuel is obtained by partial combustion of coke?
a) Coke oven gas
b) Producer gas
c) Coal gas
d) Blast furnace gas
View Answer
Answer: b
Explanation: Producer gas is obtained by partial combustion of coke or coal in the presence of air and steam mixture. It has a calorific value ranging between 5000 kJ/mm^3 to 6800 kJ/mm^3. It is used in glass melting in Industries and also for power generation.

What gaseous Fuel is obtained by passing steam over candescent coke?
a) Producer gas
b) Water gas
c) Coal gas
d) Coke over gas
View Answer

Answer: b
Explanation: Water gas is obtained by passing steam over candescent coke. It burns with a blue flame and hence it is known as blue water gas. It has calorific value ranging between10500KJ/mm^3 to 2300KJ/mm^3. It is used in welding and in furnaces.

Which gaseous fuel is produced by passing air and steam over waste coal?
a) Blast furnace gas
b) Coal gas
c) Mond gas
d) Coke oven gas
View Answer
Answer: c
Explanation: Mond gas is gaseous fuel that is produced by passing air and large amount of steam over waste coal at about 650^oC. It has a calorific value of 5800KJ/mm^3. The mond gas process was designed to convert cheap coal into flammable gas, which was made up of mainly hydrogen while recovering ammonium sulphate. The gas produced was rich in hydrogen and poor in carbon monoxide. Although it could be used for some industrial purposes and power generation, the gas was limited for heating or lighting.

Which of the fuels give enormous amount of energy?
a) Gaseous
b) Solid
c) Liquid
d) Nuclear
View Answer
Answer: d
Explanation: Nuclear fuels result in generation of enormous amount of energy by nuclear reactions namely fission and fusion. In fission reactions, a heavy atom is split by neutrons into two lighter fragments. In fusion reactions, two lighter atomic nuclei are fused together to form a single, heavy nucleus. In order to carry out nuclear reactions fissionable materials are used as fuels.

Which is the only nuclear fuel that occurs in nature in abundantly?
a) Plutonium
b) Radium
c) Thorium
d) Uranium
View Answer
Answer: d
Explanation: Uranium is the only fissionable nuclear fuel occurring in nature. It consists of 99.3% of $_{92}U^{238}$, 0.7% $_{92}U^{235}$ and small traces of $_{92}U^{234}$. Out of these isotopes only $_{92}U^{235}$ is used in fission reaction. Uranium is a very heavy metal which has been used as an abundant source of concentrated energy for 60 years.

What do you get when you convert $_{92}U^{238}$ (uranium) by conversion process and reacting with neutron?
a) $_{94}Pu^{239}$
b) $_{94}Pu^{231}$
c) $_{94}Pu^{241}$
d) $_{94}Pu^{244}$
View Answer

Answer: a
Explanation: Conversion process of uranium $_{92}U^{238}$
$_{92}U^{238} + _{0}n^{1}$ -> $_{92}U^{239} + \gamma$ – radiation
$_{92}U^{239}$ -> $_{93}Np^{239}$ (Neptunium) + $_{-1}e^{0}$ (Electron)
$_{93}Np^{239}$ -> $_{94}Pu^{239} + _{-1}e^{0}$

What do you get when breeding process is carried out on $_{90}Th^{232}$?
a) $_{92}U^{233}$
b) $_{92}U^{234}$
c) $_{92}U^{235}$
d) $_{92}U^{236}$
View Answer
Answer: a
Explanation: When breeding process is performed on $_{90}Th^{232}$ (Thorium)
$_{90}Th^{232} + _{0}n^{1} \rightarrow _{90}Th^{233} + \gamma$ -radiation
$_{90}Th^{233} \rightarrow _{91}Pa^{233}$ (Protactinium) + $_{-1}e^{0}$ (Electron)
$_{91}Pa^{233} \rightarrow _{92}U^{233} + _{-1}e^{0}$.

Which fuels can breed fissile uranium-233 to be used in various kinds of nuclear reactor?
a) Thorium
b) Neptunium
c) Plutonium
d) Radium
View Answer
Answer: a
Explanation: Thorium fuels can breed fissile uranium-233 to be used in various kinds of nuclear reactor. The use of thorium as a new primary energy source has been tantalizing prospects for many years. It is fertile rather than fissile, and can only be used as a fuel in conjunction with a fissile material.

Which two nuclear fuels are produced artificially?
a) $_{92}Pu^{239}$ and $_{92}U^{233}$
b) $_{92}Pu^{244}$ and $_{92}U^{234}$
c) $_{92}Pu^{241}$ and $_{92}U^{235}$
d) $_{92}Pu^{242}$ and $_{92}U^{236}$
View Answer
Answer: a
Explanation: Plutonium $_{92}Pu^{239}$ and uranium $_{92}U^{233}$ are the fissionable materials produced artificially from $_{92}U^{238}$ and $_{90}Th^{232}$ respectively. Uranium-238 and thorium 232 are available in nature. They are known as fertile materials. These fertile materials when placed close to $_{92}U^{235}$ in a reactor absorb the emitted neutrons to produce fissionable materials as follows.

What helps in converting uranium into fuel?
a) Breeder
b) Vitrification
c) Fuel fabricator
d) Enrichment plant
View Answer
Answer: c
Explanation: Fuel fabrication plants help in converting enriched uranium into fuel for nuclear reactors. For light water reactors, uranium is received from an enrichment plant in

solid form. It is then converted into uranium dioxide powder. This powder is passed into pellets and packed into fuel assemblies.

The process of burning fuels in the presence of oxygen is called_____
a) Induction
b) Ignition
c) Condensation
d) Combustion
View Answer
Answer: d
Explanation: The process of burning fuels in the presence of oxygen is called combustion. Due to the presence of combustible elements like carbon (C), hydrogen (H) and sulfur (S), fuels burn in presence of oxygen and generate heat from the fuels.

The minimum temperature at which a substance begins to burn is called _____
a) Fire point temperature
b) Auto ignition
c) Ignition temperature
d) Flash point temperature
View Answer
Answer: c
Explanation: The minimum temperature at which a substance begins to burn is called ignition temperature. No substance can catch fire unless it is heated up to a certain minimum temperature. The ignition of every substance is definite. For example, the ignition temperature of white phosphorous is 35°C. It means, white phosphorous starts burning only if it is heated up to 35°C.

The substance which helps in combustion of fuels is called _____
a) Igniter
b) Flammables
c) Supporter
d) Inflammables
View Answer
Answer: c
Explanation: The substance which helps in combustion of fuels is called supporter fuels/combustible elements. For example, oxygen is a supporter of combustion because in the absence of oxygen fuels cannot burn.

What is necessary for complete combustion of fuels?
a) There should be no water content in the fuel
b) Sufficient amount of air is required
c) High quantity of fuel
d) Open space to burn easily
View Answer
Answer: b
Explanation: For complete combustion of fuels, it is necessary to supply sufficient amount of air. If air supplied is not sufficient then combustion will be incomplete. This means carbon in the fuel burns to produce carbon monoxide (CO) instead of carbon dioxide (CO_2), and thus reducing the amount of oxygen required and amount of heat generated.

$C + O_2 \rightarrow$_____
a) CO
b) CO_2
c) CO_3
d) 2CO
View Answer
Answer: b
Explanation: Based on molecular weight, 12kg of carbon combines with 32kg of oxygen forming 44kg of carbon dioxide.
i.e., 12kg of C + 32 kg of O_2 => 44kg of CO_2
1kg of C + 8/3kg of O_2 => 11/3kg of CO_2
Reaction type: synthesis.

$C + O_2$ => _____
a) CO
b) $2CO_2$
c) 2CO
d) CO_3
View Answer
Answer: c
Explanation: Balanced equation: $2C + O_2$ => 2CO [Synthesis reaction] Oxygen is left in excess, based on the molecular weight, 24kg of carbon combines with 32kg of oxygen forming 56kg of carbon monoxide
24kg of C + 32kg of O_2 => 56kg of CO
1kg of C + 4/3kg of O_2 => 7/3kg of CO.

$CO + O_2$ => _____
a) $2CO_2$
b) CO_2
c) CO
d) CO_3
View Answer
Answer: a
Explanation: Based on molecular weight, 56kg of carbon monoxide combines with 32kg of oxygen forming 88kg of CO_2
Balanced equation: $2CO + O_2$ => $2CO_2$
56kg of CO + 32kg of O_2 => 88kg of CO_2
1kg of CO + 4/7kg of O_2 => 11/7kg of CO_2.

$H_2 + O_2$ => _____
a) H_2O
b) OH
c) H_3O
d) $2H_2O$
View Answer
Answer: d
Explanation: Based on molecular weight, 32kg of sulfur combines with 32kg of oxygen forming 36kg of water.
Balanced equation: $2H_2 + O_2$ => $2H_2O$
4kg of H_2 + 32kg of O_2 => 36kg of H_2O
1kg of H_2 + 8kg of O_2 => 9kg of H_2O.

$S + O_2 \Rightarrow$ _____
a) SO_3
b) SO_2
c) S^{2-}
d) $2SO_2$
View Answer
Answer: b
Explanation: Based on molecular weight, 32 kg of sulfur combines with 32 kg of oxygen forming 64 kg of SO_2
$S + O_2 \Rightarrow SO_2$
32 kg of S + 3 2 kg of $O_2 \Rightarrow$ 64 kg of SO_2
1 kg of S + 1 kg of $O_2 \Rightarrow$ 2 kg of SO_2.

The amount of heat liberated by complete combustion of unit quantity of fuel is known as _____
a) Agitation
b) Combustion
c) Calorific value
d) Thermogenesis
View Answer
Answer: c
Explanation: when fuels are burnt, heat is produced. It can also be defined as the amount of heat produced on complete burning of 1gm of fuel. SI unit of calorific value is kJ/g. The chemical reaction is typically hydrocarbon or other organic molecule reacting with oxygen to form carbon dioxide and water and release heat.

What is the significance of calorific value?
a) Helps in deciding which fuel is good
b) Helps in locating fuel
c) Helps in deciding ignition temperature
d) Helps in deciding fire point
View Answer
Answer: a
Explanation: The different fuels have different calorific values, i.e. different fuels produce different amount of heat in heat on burning. The calorific value of fuel helps us to decide that which fuel is good for us. This is done by comparing the calorific values of fuels with each other. Usually, a fuel having higher calorific value is considered to be a good fuel.

Which gas has the highest calorific value among given option?
a) Oxygen
b) Helium
c) Hydrogen
d) Nitrogen
View Answer
Answer: c
Explanation: Hydrogen gas has the highest calorific value of 150KJ/g among all. So, hydrogen gas is considered is considered to be an extremely good fuel. However, hydrogen gas is not used as a fuel in homes and industries. Reason is hydrogen is highly combustible and it burns with explosion when lighted, its transportation from place to place is very difficult, and the cost of production of hydrogen is very high.

How much percent of hydrogen gas does methane contain?
a) 25%
b) 50%
c) 68%
d) 85%
View Answer
Answer: a
Explanation: Methane contains 25% of hydrogen. Since the calorific value of fuels depends on the percentage of hydrogen present in them. So the fuels which have higher percentage of hydrogen will have higher calorific value as compared to those fuels which have lower percentage of hydrogen.

Which calorimeter is used to find calorific values of solid and liquid fuels?
a) Boy's calorimeter
b) Bomb calorimeter
c) Junker's calorimeter
d) Calvet-type calorimeter
View Answer
Answer: b
Explanation: The calorific value of solid of solid and liquid fuel is defined as the amount of heat liberated by complete combustion of unit mass of fuel. In SI unit s it is expressed in kJ/kg. A bomb calorimeter is a type of constant volume calorimeter used in measuring heat of combustion of particular reaction. Bomb calorimeters have to withstand the large pressure within the calorimeter as the reaction is being measured.

Which calorimeter is used to find calorific values of gaseous fuels?
a) Bomb calorimeter
b) Junker calorimeter
c) Adiabatic calorimeter
d) Isothermal titration calorimeter
View Answer
Answer: b
Explanation: The calorific values of gaseous fuel are defined as the amount of heat liberated by complete combustion of unit volume of fuel. SI unit is KJ/m^3. This calorimeter works on principle of burning of a known volume of gas an imparting the heat with maximum efficiency to steadily flowing water and finding out the rise in temperature of a measured volume of water.

The calorific value of all organic compounds has the sign corresponding to a _____
a) Exothermic reaction
b) Endothermic reaction
c) Single displacement reaction
d) Synthesis reaction
View Answer
Answer: a
Explanation: The calorific value of all organic compounds has the sign corresponding to an exothermic reaction. Because the double bond in molecular oxygen is much weaker than other double bonds or pairs of single bonds, particularly those in combustion products carbon dioxide and water, conversion of the weak bonds in o_2 to the stronger bonds in CO_2 and H_2O releases energy as heat.

What value of a substance, usually a fuel or food is the amount of heat released during the combustion?
a) Energy value
b) Flash point value
c) Fire point value
d) Auto ignition
View Answer
Answer: a
Explanation: Energy value (heating value or calorific value) of a substance, usually a fuel or food is the amount of heat released during the combustion of a specified amount of it. The energy value is characteristic for each substance. It is measured in units of energy per unit of the substance, usually mass, such as Kj/Kg, KJ/mol, and kcal/kg.

What accounts for the presence of water in the exhaust leaving as vapor?
a) Gross calorific value
b) Flash point value
c) Ignition temperature value
d) Net calorific value
View Answer
Answer: a
Explanation: Gross heating value accounts for water in the exhaust leaving as vapor, and includes liquid water in the fuel prior to combustion. This value is important for fuels like wood and coal, which will usually contain some amount of water prior to burning.

What is the factor on which, difference between the two heating values of fuel depends on?
a) Physical properties
b) Reactants
c) Chemical composition
d) Products
View Answer
Answer: c
Explanation: The difference between the two heating values depends on the chemical composition of the fuel. In the case of pure carbon or carbon monoxide, the two heating values are almost identical, the difference being the sensible heat content of carbon dioxide between 150^{o}C to 25^{o}C.

Which is the common method to relate higher calorific value to lower calorific value?
a) HCV = LCV + H_V ($n_{H2}O$, out / $n_{fuel, in}$)
b) LCV = HCV + H_V ($n_{H2}O$, out / $n_{fuel, in}$)
c) HCV = LCV + H_V ($n_{fuel, in}$/ $n_{H2}O$, out)
d) LCV = HCV + H_V ($n_{fuel, in}$/ $n_{H2}O$,
out) View Answer
Answer: a
Explanation: H_V – heat vaporization of water.
$n_{H2}O$, out – moles of water vaporized.
$n_{fuel, in}$ – number of moles of fuel combusted.
High calorific value is equal to low calorific value plus, product of heat of vaporization of water and moles of water vaporized by moles of fuel combusted.

Based on what basis are fuels compared?
a) Fire point value

b) High calorific value
c) Flash point value
d) Low calorific value
View Answer
Answer: d
Explanation: On basis of low calorific value the fuels are compared. Low calorific value is the amount of heat evolved when a unit weight of fuel is completely burnt and water vapor leaves with combustion products.

Which value is determined by bringing all products of combustion back to original pre-combustion temperature?
a) Higher calorific value
b) Low calorific value
c) Flash point value
d) Fire point value
View Answer
Answer: a
Explanation: High calorific value is determined, as all fuels contain hydrogen; they produce water vapor during combustion. When the products of combustion containing water vapor are cooled back to initial temperature, then all water vapors formed condense and evolve latent heat. This adds up to the heat liberated by burning the fuel, producing maximum amount of heat per kg of fuel. This heat is known as the higher calorific value of fuel, and it is denoted by HCV.

Which calorific value is same as the thermodynamic heat of combustion?
a) Net calorific value
b) Flash point value
c) Gross calorific value
d) Fire point value
View Answer
Answer: d
Explanation: Gross calorific value is as same as the thermodynamic heat of combustion since the enthalpy change for the reaction assumes a common temperature of the compounds before and after combustion, in which case the water produced by combustion is condensed to a liquid, hence yielding its latent heat of vaporization.

Which value is determined by subtracting the heat of vaporization of the water from the higher heating value?
a) Gross calorific value
b) Net calorific value
c) Ignition temperature
d) Fire point temperature
View Answer
Answer: b
Explanation: Net calorific value determined. In most of the combustion processes, the products of combustion cannot be cooled to its initial temperature. Thus water vapors don’t condense and hence the latent heat of water vapor is lost to the atmosphere. The resultant heat liberated by the fuel which excludes the latent heat of evaporation of water vapors is known as lower calorific value of fuel.

Which formula is used to determine higher calorific value of fuel?
a) Rayleigh’s formula

b) Lamme’s equation
c) Dulongs’s formula
d) Cauchy’s formula
View Answer
Answer: c
Explanation: Higher calorific value of the fuel can be determined by using Dulongs’s formula. Let C, H, O and S represent the percentage by weight of carbon, carbon, oxygen and sulfur respectively.
HCV = 1/100 [33900 + 144000(H – (O/8)) + 9295 S] kJ/Kg
This formula gives gross heating value in terms of the weight fractions of carbon, hydrogen, oxygen and sulfur from the ultimate analysis.

Lower calorific value can be determined by equation:
a) LCV = HCV – m*2466
b) LCV = HCV + (m/2466)
c) LCV = HCV – (m/2466)
d) LCV = HCV + (m*2466)
View Answer
Answer: a
Explanation: Lower calorific value can be determined equation [LCV = HCV – m*2466]. The latent heat lost to the atmosphere depends on evaporation pressure and the amount of water vapors formed. Due to difficulty in measuring the evaporation pressure, it is assumed that evaporation takes place at a saturation temperature of 15°C. The latent heat corresponding to this saturation is 2466 kl/kg.
m = mass of water vapour formed per kg of fuel burnt.

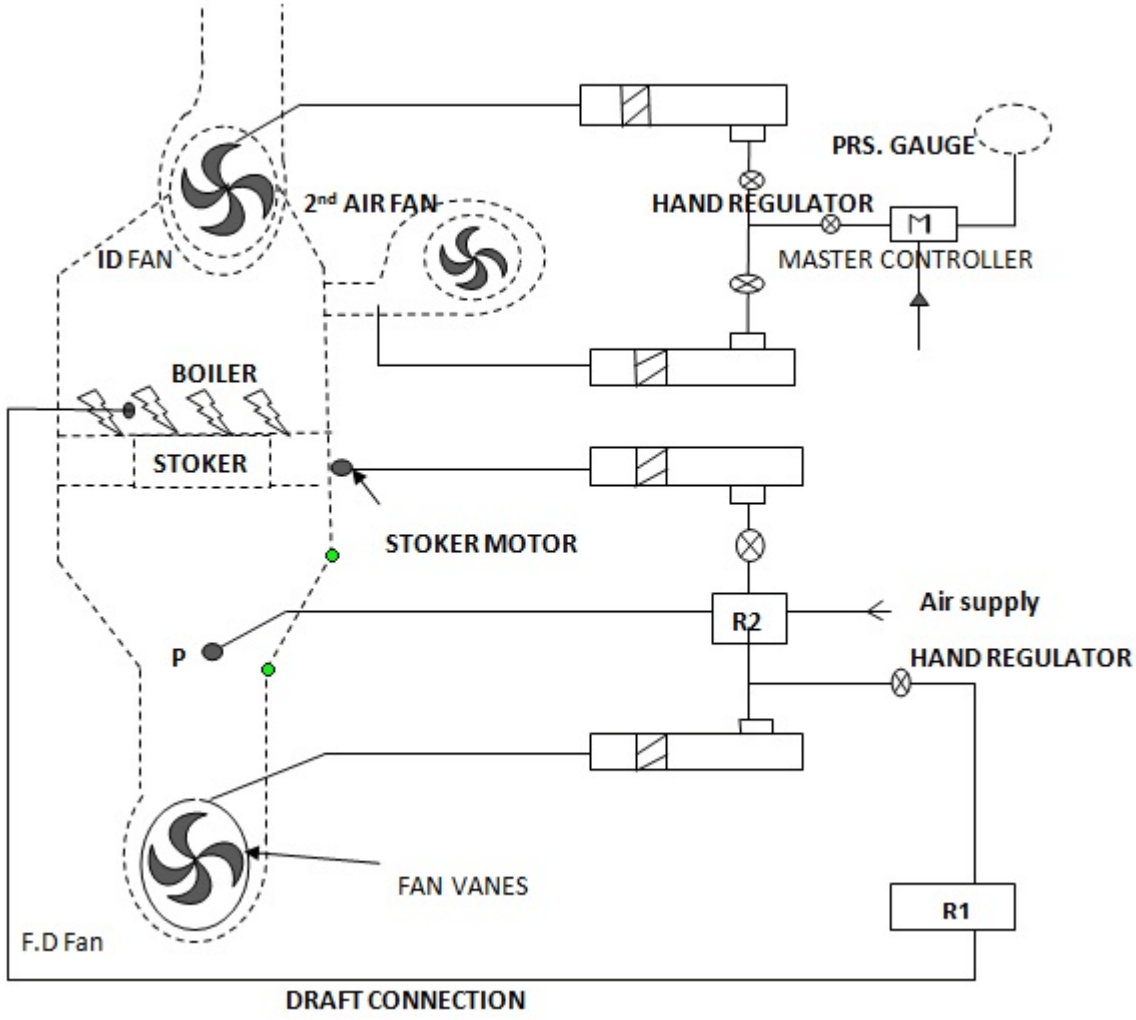
Which fuel has higher calorific value among given fuels?
a) Natural gas
b) Gasoline
c) Diesel
d) Fuel oil
View Answer
Answer: b
Explanation: Gasoline also called as petrol, has the highest calorific value. Gasoline is a transparent petroleum derived liquid that is used primarily as a fuel in internal combustion engines. It consists of mostly of organic compounds obtained by the fractional distillation of petroleum, enhanced with variety of additives.

What is amount of minimum air required per kg of liquid fuel for complete combustion using carbon, oxygen, hydrogen and sulfur?
a) 1/23 [8/3 C + 8(H – (O/8)) + S]
b) 1/100 [8/3 C + 8(H – (O/8)) + S]
c) 1/100 [8/3 C + 8(H – (0/8))]
d) 1/23 [8/3 C + 8(H – (0/8))]
View Answer
Answer: a
Explanation: Let C, H, O and S represent percentage by mass of carbon(C), Hydrogen (H_2), oxygen and sulfur respectively.
The mass of oxygen required for complete combustion of fuel is given by,
= 1/100 [8/3 C + 8H – O + S]
= 1/100 [8/3C + 8(H – (0/8)) + S]

As air contains 23% of oxygen by mass, minimum air required for burning one kg of liquid fuel completely is given by,
Min. air required = 1/100 [8/3 C + 8(H – (O/8)) + S] 100/23
= 1/23 [8/3 C + 8 (H – (O/8)) + S].

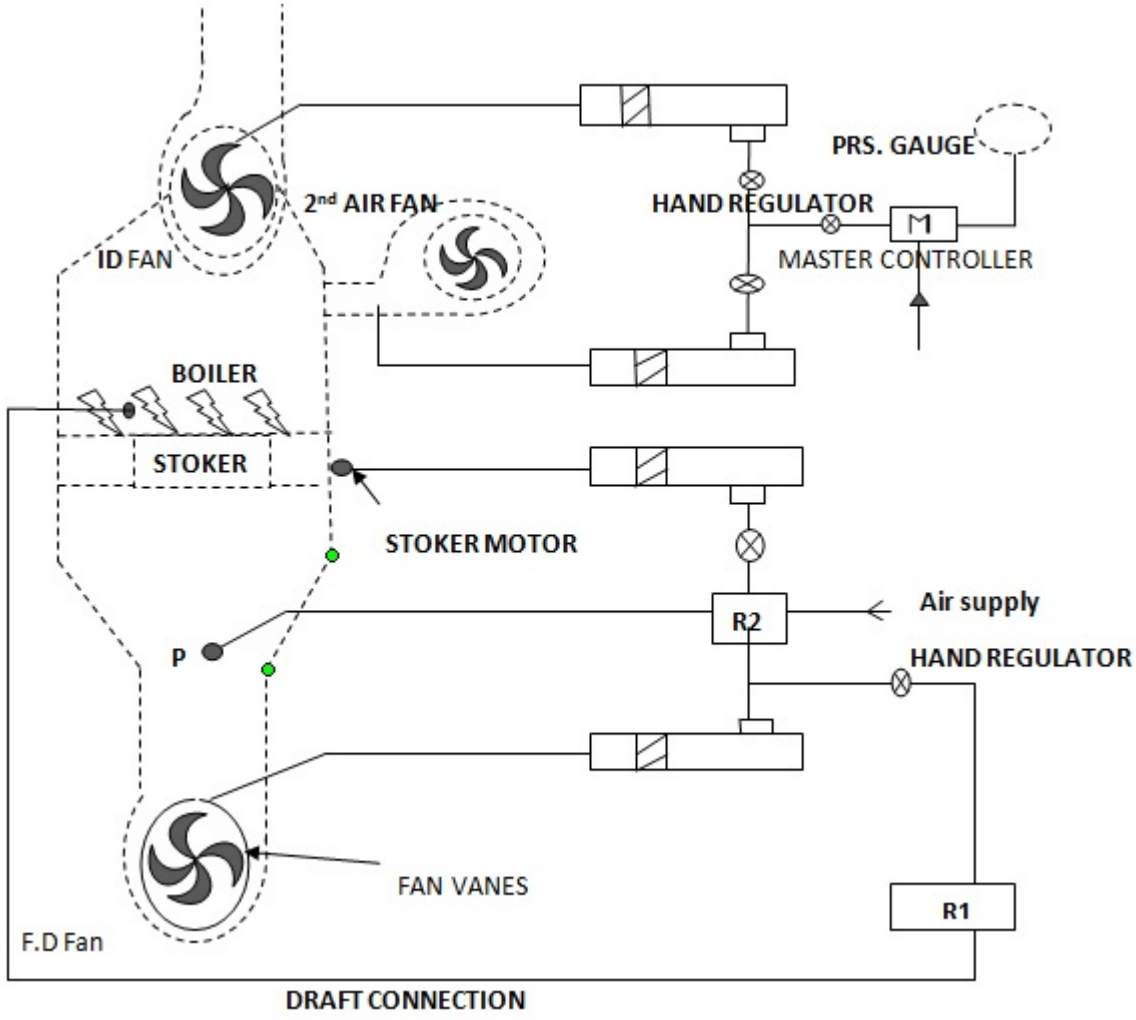
What is minimum amount of air required per m^3 of gaseous fuel for complete combustion?
a) 1/21 [(H_2/2) + (CO/2) + 2CH_4 + 3C_2H_4] m^3/m^3 of fuel
b) 1/100 [(H_2/2) + (CO/2) + 2CH_4 + 3C_2H_4] m^3/m^3 of fuel
c) 1/21 [(H_2/2) + (CO/2) + 3C_2H_4] m^3/m^3 of fuel
d) 1/100 [(H_2/2) + (CO/2) + 3C_2H_4] m^3/m^3 of fuel
View Answer
Answer: a
Explanation: Volumetric analysis of fuels hydrogen, carbon monoxide, methane, ethane, carbon dioxide and nitrogen is done and required minimum amount of oxygen is found for one m^3 of gaseous fuel:
O_2 required/m^3 of fuel = 1/100[(H_2/2) + (CO/2) + 2CH_4 + 3C_2H_4] m^3
As atmospheric air contains 21% of O_2 by volume, minimum air required t burn one m^3 of gaseous fuel is given by,
Minimum volume of air required (cm^3/m^3 of fuel):
= 1/100 [(H_2/2) + (CO/2) + 2CH_4 + 3C_2H_4] 100/21
= 1/21 [(H_2/2) + (CO/2) + 2CH_4 + 3C_2H_4] m^3/m^3 of fuel.

What is the basis on principle of automatic control of combustion is determined?



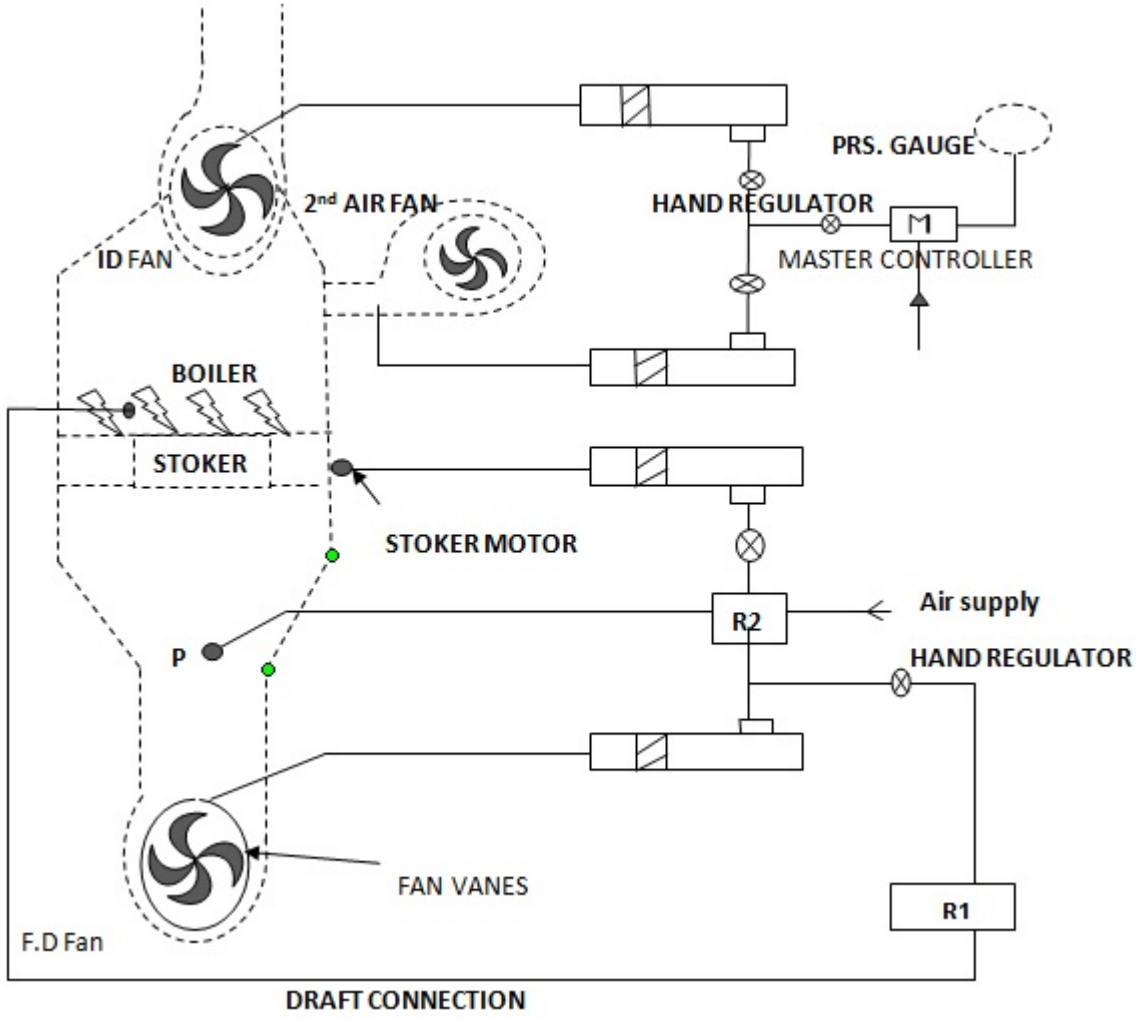
a) Control of fuel supply to the boiler
b) Speed of rotation of fans
c) Control of combustion
d) Control of steam pressure
View Answer

What quantities need to maintained/regulated for effective control of combustion?



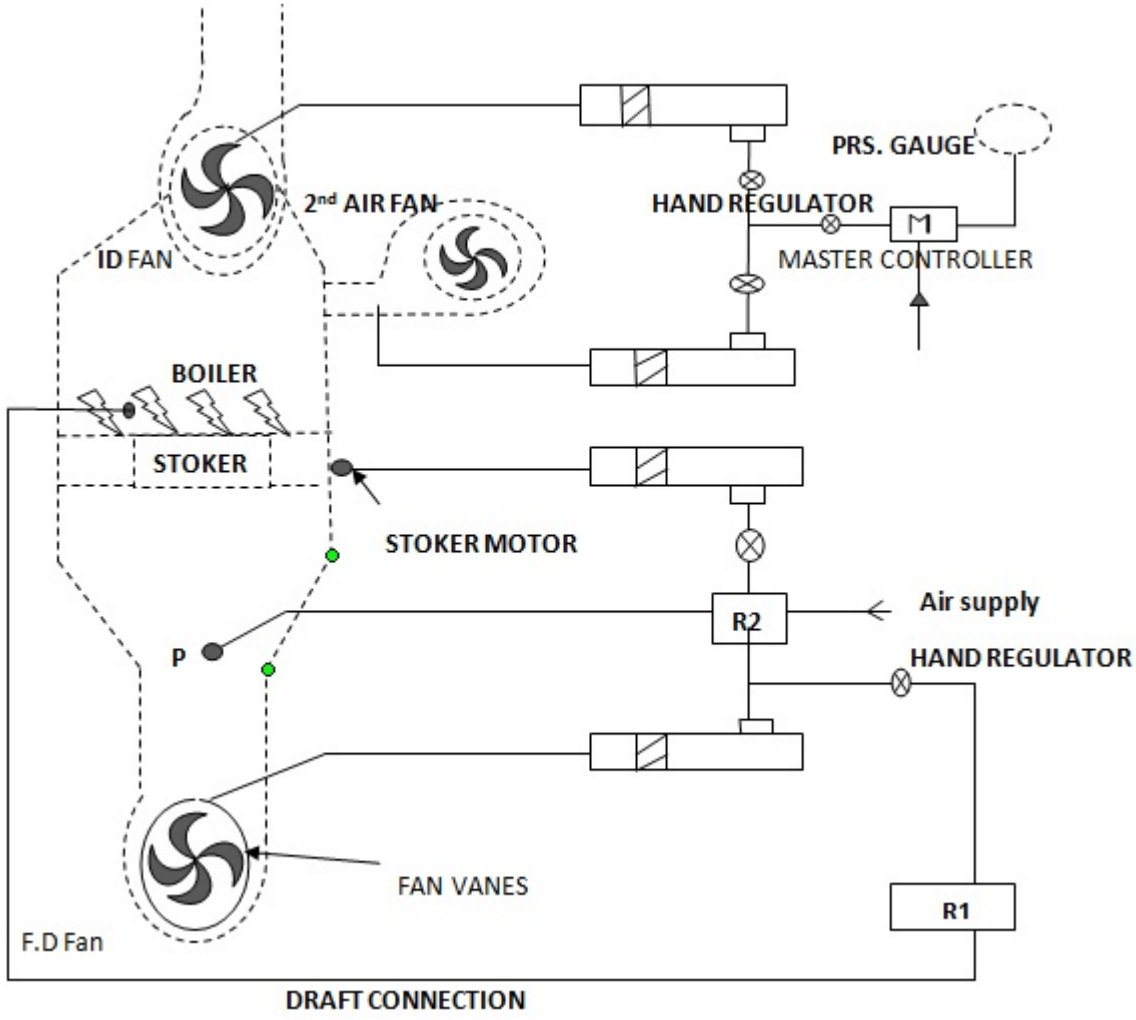
a) Induced draught and forced draught fans pressure
b) Air and steam gauge pressure
c) Fuel flowing out of stoker
d) Air and fuel supply
View Answer

What is necessary to ensure products of combustion flow into the chimney?

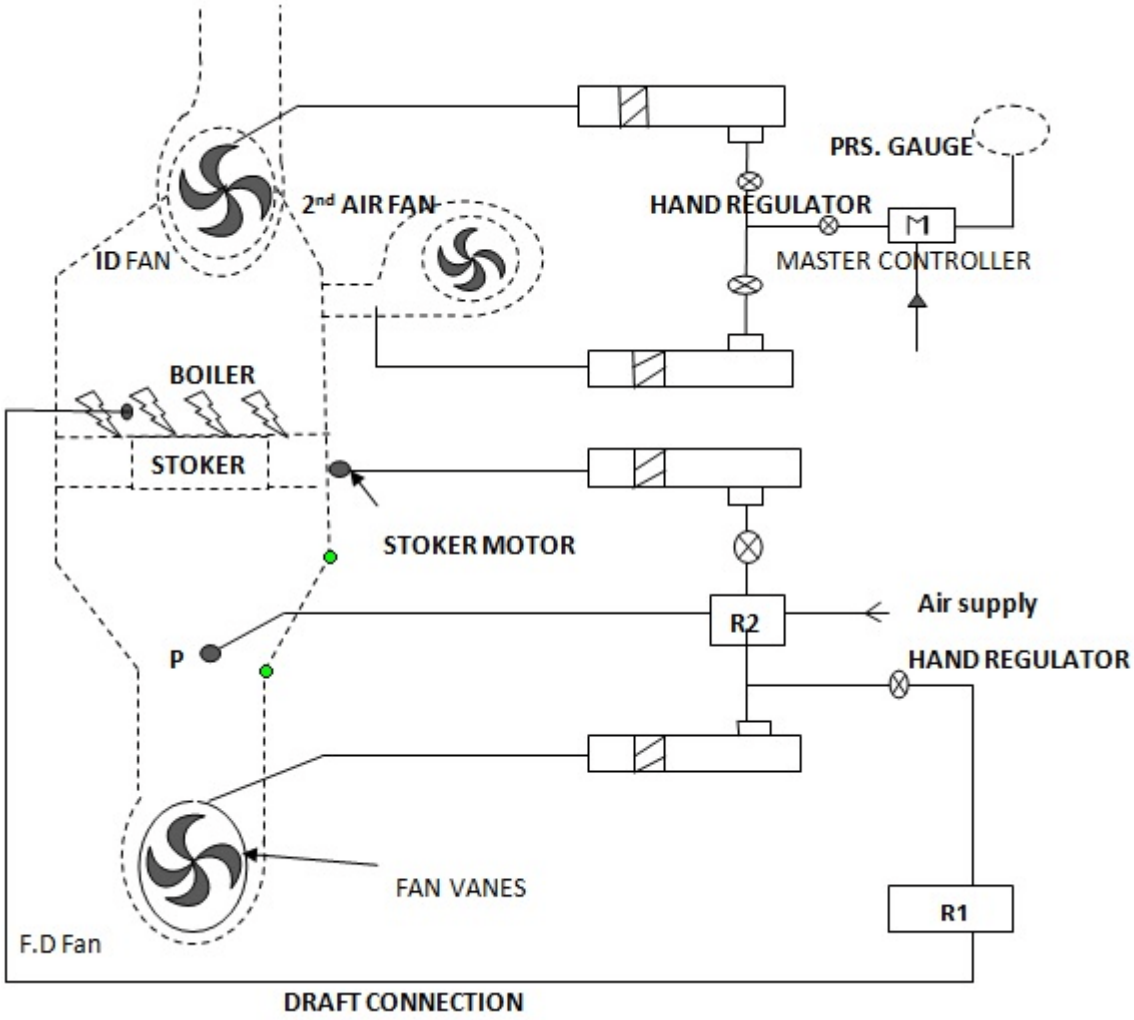


a) Air speed
b) Draft in the chimney
c) Differential gas pressure
d) Swirl flow of exhaust air
View Answer

When does automatic control system of combustion come into operation?

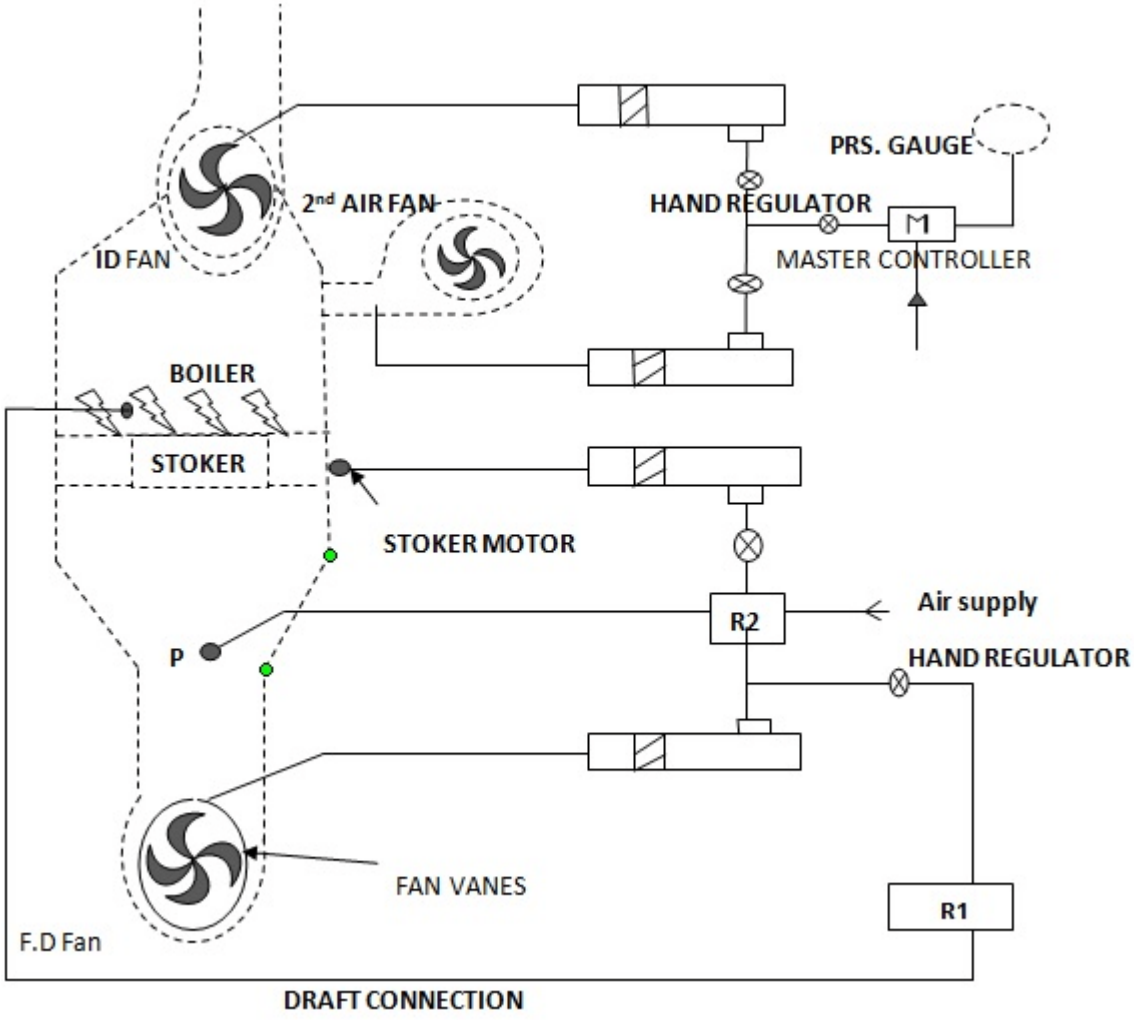


a) When there is no fluctuation in furnace draft
b) When there is variation in steam flow rate
c) When the draft connection is clogged
d) When there is minimal amount of air supply
View Answer
Which is the component that maintains forces in whole automatic combustion control system?



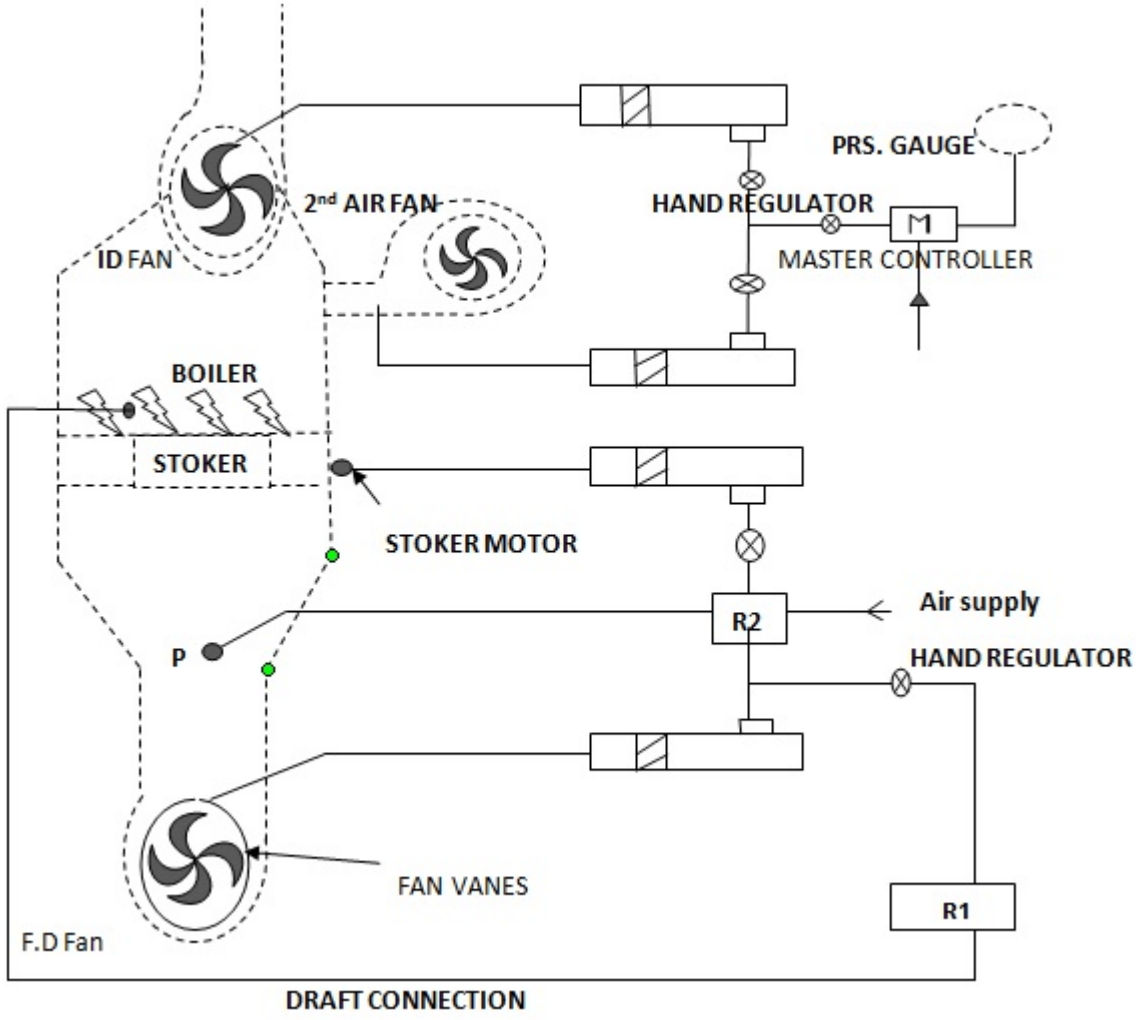
a) Steam pressure gauge
b) Fan vanes
c) Master controller
d) Relay 1 & 2
View Answer

When does master controller comes into action?



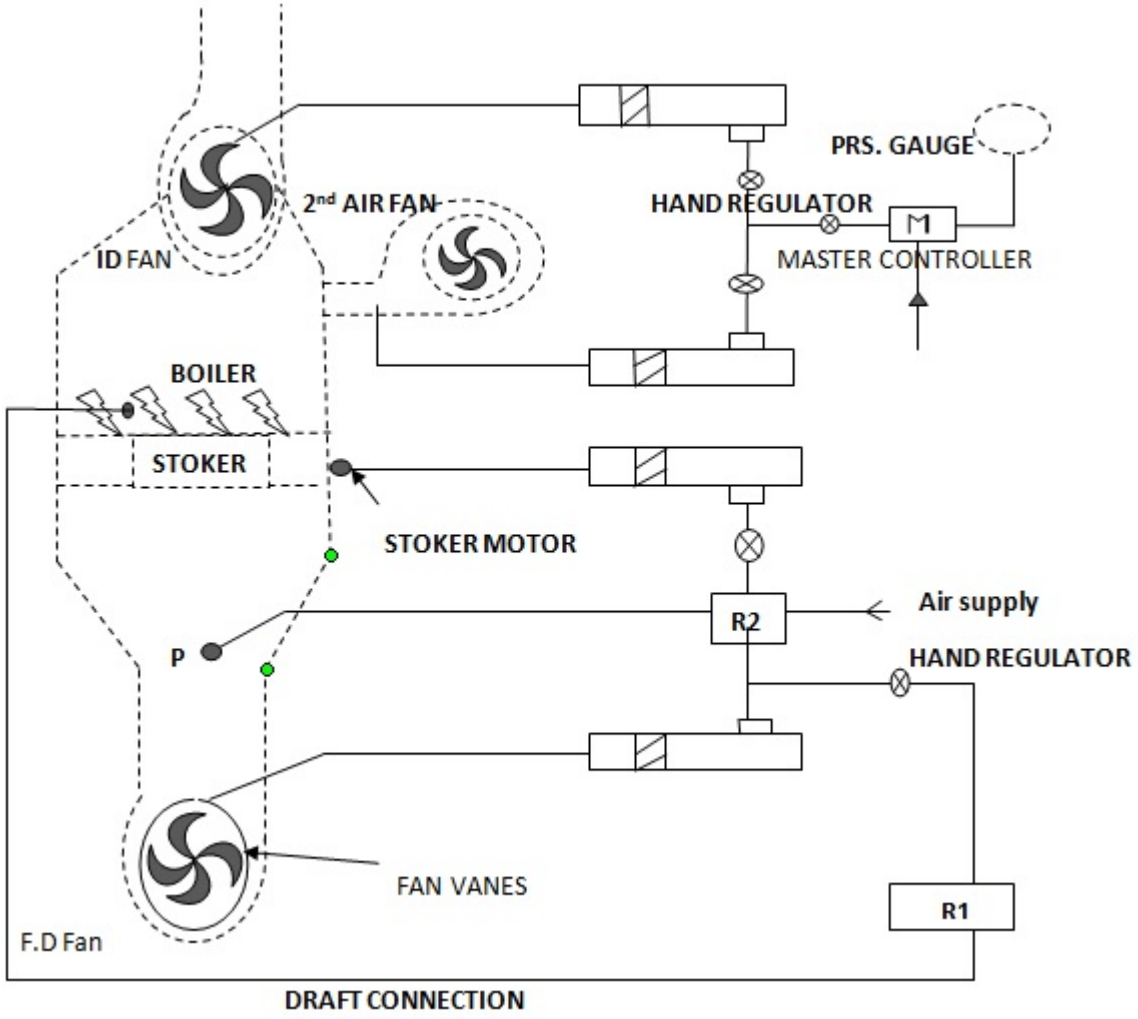
a) When there is variation in steam flow rate
b) When there is variation in fuel supply
c) When there is variation in steam pressure
d) When there is variation in draught fans
View Answer

When does relay’s 1 and 2 come into operation?



a) When there are changes in steam pressure
b) When there is change in forced draught
c) When there is change in steam flow rate
d) When there is change in induced draught
View Answer

What is the purpose of Automatic combustion control system?



a) To get constant steam pressure
b) To maintain steady state combustion
c) To get constant steam output
d) To save the time and manual labour View Answer
Answer: b
Explanation: The automatic combustion control system provides the effective prevention of the environmental pollution and steady combustion condition to get a constant steam output. But few factors prevent steady combustion condition such as unbalanced combustion air and the movement of the burn-out position in the incinerator.

UNIT NO - II

Steam Condenser and Environmental Impact of Thermal Power Plant

1) Pulverized coal is
a) Coal free from ash
b) Non-smoking coal
c) Coal which bums for long time
d) Coal broken into fine particles
Answer: d
Explanation: Pulverized coal also known as powdered coal or coal dust since it is as fine as face powder in cosmetic make-up.
3) Critical pressure of water is
a) 1 kg / cm2
b) 100 kg / cm2
c) 155 kg / cm2
d) 217.7 kg / cm2
Answer: d
Explanation: The critical pressure of a substance is the pressure required to liquefy a gas at its critical temperature.

4) Coal used in power plant is also known as
a) steam coal
b) charcoal
c) coke
d) soft coal
Answer: a
Explanation: Because this coal is used to generate steam.
5) The maximum temperature of steam that can be used is fixed from metallurgical considerations. This temperature limit is called?
a) Mining Limit
b) Metallurgical Limit
c) Metallic Limit
d) None of the mentioned
Answer: b
Explanation: 'Metallurgical Limit' is defined as the lowest temperature limit of usable steam fixed by metallurgical considerations.
6) Most of the turbine expansion takes place in?

a) Liquid Region
b) Solid Region
c) Vapour Region
d) Plastic Region
Answer: c
Explanation: Most of the turbine expansion should take place in the vapour region, so as to increase the life of the blades of the turbine
7) Which of the following diagrams are used while analysing the effect of superheat & Inlet Pressure on mean temperature of heat addition?
a) P-V diagram
b) T-S diagram
c) P-T diagram
d) V-T diagram
Answer: b
Explanation: Using the T-S diagram gives us an overview as to where a particular process occurs, i.e., it is within the solid region, the gaseous region or the vapour region, we prefer T-S diagram for analysis process.
8) The heat transferred when the H2O in the products is in the liquid state is called?
a) HCV
b) LCV
c) LHV
d) None of the mentioned Answer: a

Explanation: The heat transferred when the H2O in the products is in the liquid state is called HCV [Higher Calorific Value].

9) The function of a condenser in a thermal power plant is
A. To act as reservoir to receive steam for turbine
B. To condense steam into condensate to be reused again
C. To create vacuum
D. All of the above

Answer D

10) The commonly used material of pipes in condensers is
A. Mild steel
B. Stainless steel
C. Cast iron
D. Admiralty brass

Answer D

11) A condenser where circulating water flows through tubes which are surrounded by steam, is known as
A. Surface condenser
B. Jet condenser
C. Barometric condenser
D. Evaporative condenser

Answer A

12) The vacuum obtainable in a condenser is dependent upon
A. Capacity of ejector
B. Quantity of steam to be handled
C. Any of above two is possible
D. Temperature of cooling water

Answer D

13) The ratio of actual vacuum to the ideal vacuum in a condenser is called
A. Condenser efficiency
B. Vacuum efficiency
C. Boiler efficiency D. Nozzle efficiency Answer B

14) A condenser in a steam power plant is
A. Increases expansion ratio of steam
B. Reduces back pressure of steam
C. Reduces temperature of exhaust steam
D. All of the above

Answer D

15) The most common type of Evaporator is?
a) Flooded Evaporator
b) Plate Evaporator
c) Coil Evaporator
d) Brine Evaporator

Answer: b

Explanation: The most common type is a coil winding on a plate & so the name ‘plate evaporator’

16) In Rankine Cycle, water is converted to saturated liquid in
a) Evaporator

b) Economizer
c) Super heater
d) Preheater

Answer: b

Explanation: The saturation of water occurs in an Economizer in a Rankine Cycle.

17) If Evaporator & Condenser pressures are p & q, the intercooler pressure P is given as?
a) P= pq
b) P= p/q
c) P= (pq) (1/2)
d) P=p2q

Answer: c

Explanation: The relation between Intercooler pressure, Evaporator & Condenser is, P = (pq) (1/2).

18) Phase change at constant pressure takes place in?

a) Economiser
b) Evaporator
c) Superheater
d) Air-Preheater
Answer: c
Explanation: Super heater undergoes a change in phase at constant pressure.
19) Which of these factors don't cause Internal Irreversibility of a Rankine cycle?
a) Throttling
b) Mixing
c) Fluid Friction
d) Fluid flow
Answer: d
Explanation: The Rankine cycle is an Irreversible cycle. For a cycle to be irreversible naturally throttling, mixing & friction in fluids are the factors that cause this Irreversibility.
20) What is the unit of Heat rate?
a) kJ/KW
b) KW/kJ
c) kJ
d) KW
Answer: a
Explanation: Heat rate is the rate of input required to produce unit shaft output.

21) A condenser where circulating water flows through tubes which are surrounded by steam, is known as.
A. Surface condenser
B. Jet condenser
C. Barometric condenser
D. Evaporative condenser
Answer A.
22) The vacuum obtainable in a condenser is dependent upon
A. Capacity of ejector
B. Quantity of steam to be handled
C. Any of above two is possible
D. Temperature of cooling water
Answer E.
23) The ratio of actual vacuum to the ideal vacuum in a condenser is called
A. Condenser efficiency
B. Vacuum efficiency
C. Boiler efficiency
D. Nozzle efficiency
Answer B
24) A condenser in a steam thermal plant
(a) Decreases expansion ratio in the turbine
(b) Decreases back pressure of steam
(c) Increases condensation temperature
(d) None
ANS: (b)
25) Hot water coming out of condenser is cooled in a
(a) Shell and tube heat exchanger
(b) In a finned tube heat exchanger
(c) In a cooling pond
(d) None
ANS: C
26) Surface condenser is one in which
(a) Steam passes through the tubes and the water is outside
(b) Air passes through the tubes and the water is outside
(c) Water passes through the tubes and the steam is outside

(d) None
ANS: C
27) In a surface condenser, condensate and cooling water are

(a) Mixed fully
(b) Mixed partially
(c) Not mixed
(d) None
ANS: C
28) In a Jet condenser, condensate and cooling water are
(a) Mixed fully
(b) Mixed partially
(c) Not mixed
(d) None
ANS: (a)
29) Pressure in the condenser of a steam plant is
(a) More than atmospheric
(b) Equal to atmospheric
(c) Less than atmospheric
(d) None
ANS: C
30) Surface condensers and jet condensers of the same cooling capacity are compared
(a) Overall size is bigger of the surface condenser
(b) Sizes are equal
(c) Size of the surface condenser is smaller than the jet condenser
(d) None
ANS: (a)
31) Condensate can be used as feed water in a
(a) Jet condenser
(b) Surface condenser
(c) Both in Jet and Surface condenser
(d) None
ANS: (b)
32) Cooling capacity of surface condensers is
(a) Greater than that of Jet condensers

(b) Equal to that of Jet Condenser
(c) Less than that of Jet condensers
(d) None
ANS: (a)
33) Cooling water requirements for the same cooling capacity is
(a) Greater in Jet condenser
(b) Same in Jet and surface condenser
(c) Less in Jet condenser
(d) None ANS: C
34) For same cooling requirements, maintenance cost is
(a) Less in Jet condenser
(b) Equal in both surface and Jet condenser
(c) More in Jet condenser
(d) None
ANS: (a)
35) For the same cooling requirements, power to operate the air pump are
(a) More in a Jet condenser
(b) Less in a Jet condenser
(c) Same in Jet and surface condenser
(d) None
ANS: (a)
36) For the same cooling requirements, power used in pumping water is
(a) More in Jet condensers
(b) Less in a Jet condenser
(c) Equal both in Jet and Surface condenser
(d) None
ANS: (a)
37) The ratio of actual vacuum to the ideal vacuum in a condenser is called

(a) Boiler efficiency
(b) Condenser efficiency
(c) Vacuum efficiency
(d) None
ANS: C
38) The temperature of the condensate is

(a) Higher than the temperature of the cooling water
(b) Lower than the temperature of the cooling water
(c) Equal to the temperature of the cooling water
(d) None
ANS: A
39) The condenser in a steam power plant is placed between the
(a) Boiler and turbine
(b) Pump and the boiler
(c) Turbine and the pump
(d) None
ANS: C
40) The condenser used in thermal power plant is
(a) Air cooled
(b) Water Cooled
(c) Evaporative Cooled
(d) None
ANS: A
41) When air is removed in a surface condenser
(a) Absolute pressure decreases
(b) Absolute pressure increases
(c) Absolute pressure remains constant
(d) None
ANS: A
42) Spray ponds are used to cool the warm water coming from the condenser in
a. large power plants
b. Small power plants
c. Medium power plants
d. Both medium and large power plants.
ANS: B
43) Evaporative type of condenser has
a. Water in pipes surrounded by steam outside
b. Steam and cooling water mixed to give the condensate
c. Steam in pipes surrounded by water.
d. None of the above.

ANSWER: C
44) In the steam condensing power plants
(A) The amount of energy extracted per kg of steam is increased
(B) The steam, converted into water, can be re-circulated with the help of pump
(C) Both (A) and (B)
(D) None of the above
Ans: C
45) What is called when an industry removes water from a source and then returns the heated water to its source?

a) Water pollution
b) Soil pollution
c) Air pollution
d) Thermal pollution
Answer: d
Explanation: Thermal pollution occurs when an industry removes water from a source, uses the water for cooling purposes, and then returns the heated water to its source such as lakes, rivers and even oceans.
46) What is the effect of warmer temperature to the fishes?
a) Increase the metabolism

b) Decrease the metabolism
c) Stabilize the metabolism
d) Increase the solubility of oxygen
Answer: a
Explanation: The warmer temperature decreases the solubility of oxygen and increase the metabolism of fish. This changes the ecological balance of the river. Within certain limits, thermal additions can promote the certain fish and fish catch may be high in the vicinity of a power plant.
47) What is the disadvantage of control measures of thermal pollution by passing the heated water?
a) Water is lost due to leakage
b) Water is lost due to absorption
c) Water is lost due to dilution
d) Water is lost due to evaporation
Answer: d
Explanation: Thermal pollution can be controlled by passing the heated water through a large shallow cooling pond into which hot water is pumped and a cooling tower after it leaves the condenser. In both the cases large amounts of water are lost to evaporation
48) Which one of the following cause thermal pollution?
a) Release of cold water

b) Organic manures
c) Purified water
d) More number of trees
Answer: a
Explanation: Release of cold water caused thermal pollution apart for that none of the above given options contribute for thermal pollution. Many industries liberate very cool water from their reservoirs. This water when mixed up with warm water rivers it creates a misbalance in the water bodies
Growing industrial activities is one of the reasons for thermal pollution
a) TRUE
b) FALSE
Answer: a
Explanation: Growing industrial activities gives a repenting feeling to know that thermal pollutants are increasing day by day because of the growing industrial activities. Therefore, thermal pollution is also growing.
49) How does soil erosion cause thermal pollution?
a) By making natural water bodies to hold in its normal level
b) By polluting the water bodies
c) By avoiding sunlight to fall on the water bodies
d) By making natural water bodies to rise beyond their normal level
Answer: d
Explanation: Soil erosion is one of the main causes of thermal pollution. Soil erosion makes natural water bodies to rise beyond their normal level. Thus, they get more exposed to sunlight and cause thermal pollution.
50) What is a thermal shock?
a) Sudden raises of temperature to abnormal level
b) Sudden cooling of temperature to abnormal level
c) Temperature don’t change
d) Temperature change only due to environmental factors
Answer: a
Explanation: Thermal shock resulting in a rise in temperature of water bodies. When industries and factories dispose the water into water bodies the temperature suddenly raises to an abnormal level. This acts as a thermal shock for aquatic life.

51) What is the main effect of thermal pollution to the oxygen solubility in water bodies?
a) They increase the solubility of oxygen in water bodies
b) They maintain the solubility of oxygen in water bodies
c) They reduce the solubility of oxygen in water bodies
d) They don’t cause any affect in solubility of oxygen to the water bodies
Answer: c

Explanation: One of the main effects of thermal pollution is they reduced the solubility of oxygen in water bodies. This less solubility of oxygen in water mainly affects the metabolism of water animals and thus it leads to death of aquatic animals.
52) How does an artificial lake help in solving thermal pollution?

a) It stores heated water
b) It gives a good aesthetic view
c) It helps to breed fishes
d) It is used during the summer season where water scarcity cause
Answer: a
Explanation: Artificial lakes help in preventing thermal pollution. In artificial lakes, heated water can be stored easily. These lakes are very helpful for normalizing the temperature of the hot water. Hot water will not disposed back to the natural water bodies.

53) What is called for the useless heat from hot water recycled by industries?
a) Cooling towers
b) Recycling
c) Heat pump
d) Co-generation
Answer: d
Explanation: Co-generation can be helpful to combat thermal pollution. In the process of co-generation, the useless heat from hot water can be recycled and used smartly in many tasks by industries. Thus this process prevents thermal pollution.

54) Generally how many types of cooling towers are there?
a) One
b) Two
c) Three
d) Four Answer: b
Explanation: Generally the cooling towers are of two types they are, wet cooling tower and the dry cooling tower. In wet cooling tower, the heated water gets spread upon the flow directing panels. In the dry cooling tower, the heated water is made to flow in circular elongated pipes.

55) Runoff from paved surfaces can cause thermal pollution-
a) TRUE
b) False Answer: a
Explanation: Urban runoff discharged to surface likes roads and parking lots can make the water warmer. During summer seasons, the pavement gets quite hot, which creates warm runoff that gets into the sewer systems and water bodies and causes thermal pollution.

56) What is a toxic waste?
a) Substances those are not poisonous
b) Substances those are poisonous only when it taken in large quantity
c) Substances those are poisonous only when it taken in small quantity
d) Substances which work as an antidote for toxic materials Answer: c
Explanation: Toxic wastes are substances that are poisonous even in very small or trace amounts. Some may have an acute effect on humans causing death, others may have a chronic or long term effect, slowly causing irreparable harm to humans and other organisms.

57) What kind of reactions happens in corrosive waste?
a) Physical
b) Electro-chemical
c) Biological
d) Chemical Answer: d
Explanation: In corrosive waste the reaction that happens is chemical. Corrosive waste is that which destroys materials and living tissue by chemical reaction such as acid and bases and thus cause hazardous to organisms.

59) In order to dispose hazardous waste where there are no abundant lands which method is used?
a) Land disposal
b) Burning
c) Floats in water bodies
d) Incineration Answer: d
Explanation: The most common methods for disposing of hazardous waste are land disposal and incineration. In countries where there is abundant land available for disposal land disposal is used and countries where there is no abundant land incineration method is used

60) How does organic material in the buried solid waste will decompose?
a) By the action of oxidation
b) By the action of microorganisms
c) By the flow of water
d) By the soil particles Answer: b

Explanation: The organic material in the buried solid waste will decompose due to the action of microorganisms. At first the waste decomposes aerobically until the oxygen that was present in the freshly placed fill is used up by the aerobic microorganisms.

61) Which of the following is the consequence of industrial pollution?

a) Increase in the water level in seas
b) Releases of the hazardous radiations
c) Increase in the animals in forests
d) Global warming Answer: d

Explanation: Global warming is one of the most common and serious consequences of industrial pollution. The emission of various greenhouse gases such as carbon dioxide, methane from various industries increases the overall temperature of the earth, resulting in global temperature.

62) Which one of the following industries produced Sulphur dioxide and flu ash as pollutants? a) Textile industries

b) Cottage industries
c) Thermal industries
d) Coal industries Answer: c

Explanation: Thermal industries produced sulphur dioxide and flu as ash as pollutants. Sulphur dioxide is a colourless gas. In thermal industries a reduction in the atmosphere emissions of Sulphur dioxide produced by fossil fuel combustion.

A vacuum of 710 mm of Hg was obtained with barometer reading of 755 mm of Hg. Correct the vacuum to standard barometer of 760 mm.

2

Option A 720 mm of Hg
Option B 715 mm of Hg
Option C 755 mm of Hg
Option D 745 mm of Hg
Answer B

Question A vaccum of 710 mm of Hg was obtained with barometer reading of 755 mm of Hg. The temperature ofcondenser was 25oC. Determine the pressure of air in the condenser in bar. partial pressure of steam at 25oC is 0.03166 bar.

3

Option A 0.03255 bar
Option B 0.02585 bar
Option C 0.03532 bar
Option D 0.02832 bar
Answer D

Question The actual vacuum in a condenser is 1
Option A Barometric pressure+ Actual pressure
Option B Gauge pressure—atmospheric pressure
Option C Gauge pressure + atmospheric pressure
Option D None
Answer B

Question The condenser in a steam power plant is placed between the 1
Option A Boiler and turbine
Option B Pump and the boiler
Option C Turbine and the pump
Option D None
Answer C

Question How many number of spray nozzle does each module on spray pond cooling system contains? 1
Option A 1
Option B 2

Option C 3
Option D 4
Answer D

Question Select the disadvantage of cooling pond out of the given? 2
Option A The area required of cooling in a cooling pond is small
Option B Spray losses due to evaporation and windage run high
Option C There is no control over the temperature of cooled water
Option D The cooling efficiency is low compared with cooling water
Answer C

Question How is air produced in mechanical draught cooling tower? 1
Option A Air Tuyeres
Option B Propeller fans
Option C Air blowers
Option D Louvre
Answer B

Question In which type of cooling system are nozzles arranged on different elevation? 1
Option A Single deck system
Option B Double deck system
Option C Natural Flow system
Option D Direct flow system
Answer B

Question Pressure in the condenser of a steam plant is 1
Option A More than atmospheric
Option B Equal to atmospheric
Option C Less than atmospheric
Option D None
Answer C

Question Surface condensers and jet condensers of the same cooling capacity are compared 1
Option A Overall size is bigger of the surface condenser
Option B Sizes are equal
Option C Size of the surface condenser is smaller than the jet condenser
Option D None
Answer A

Question Pressure in the condenser of a steam plant is 1
Option A More than atmospheric
Option B Equal to atmospheric
Option C Less than atmospheric
Option D None
Answer C

Question Condensate can be used as feed water in a 1
Option A Jet condenser
Option B Surface condenser
Option C Both in Jet and Surface condenser
Option D None
Answer B

Question Surface condenser is one in which 1
Option A Steam passes through the tubes and the water is outside
Option B Air passes through the tubes and the water is outside
Option C Water passes through the tubes and the steam is outside

Option D None

Answer C

Question The ratio of actual vacuum to the ideal vacuum in a condenser is called 1
Option A Boiler efficiency
Option B Condenser efficiency
Option C Vacuum efficiency'
Option D None
Answer C

Question The condenser used in thermal power plant is 1
Option A Air cooled
Option B Water Cooled
Option C Evaporative Cooled
Option D None
Answer C

Question What is use of the air pumps in the condenser? 1
Option A Remove water
Option B Air leaking in the condenser and to maintain the vacuum.
Option C Maintain atmospheric pressure and the condenser.
Option D Both (a) & (b).
Answer B

Question Evaporative type of condenser has
Option A Water in pipes surrounded by steam outside. 2
Option B Steam and cooling water mixed to give the condensate.
Option C Steam in pipes surrounded by water.
Option D None of the above.
Answer c

Question What are used in the direct flow system to transverse the pond before uniting at intake? 1
Option A Separators
Option B Filters
Option C Baffle walls
Option D Porous pipes
Answer C

Question In which system is Cooling of hot water is done on tray as step by? 1
Option A Mechanical draught cooling system
Option B Hyperbolic cooling tower
Option C Atmospheric cooling tower
Option D Wet cooling tower
Answer C

Question .How does the flow of air occur in natural draught cooling towers? 2
Option A Natural pressure head density between cold outside air and humid inside air
Option B Variation in pressure of both cold outside air and humid inside air
Option C Due to the given air vents and vacuum ports
Option D Because of difference in the volume of both the of airs
Answer A

Question Centrifugal pump is a 1
Option A Turbomachinery

Option B Flow regulating device
Option C Drafting device
Option D Intercooling device
Answer A

1
Question The main function of nozzle is to
Option A Varying temperatures
Option B Pressure variations
Option C Load variations
Option D Heat variations
Answer B

Question Centrifugal pumps are a sub class of dynamic axisymmetric work absorbing turbomachinery. 1
Option A TRUE
Option B FALSE
Answer

Question What is the most effective advantage of gravitational separators? 1
Option A They consume no power
Option B They just need small amount of space for operation
Option C They are cost effective
Option D Time taken for operation is very less
Answer C

Question Which principle does cyclone separator use? 1
Option A Gravitational force
Option B \ Vortex velocity
Option C Inertia
Option D Temperatures of air
Answer C

Question
What is called when several cyclone separators are operated parallelly? 1
Option A Octa-cyclone
Option B Multi-cyclone
Option C Center-cyclone
Option D Para-cyclone
Answer B

Question What is the work of the baghouse filter? 2
Option A To remove the hot air from furnace
Option B To separate the solid particles from dust produced
Option C To remove dust particles from flue gas
Option D To wash away the contamination of dust on the walls of furnace
Answer C

Question A ‘stroker’ is a power operated fuel mechanism 1
Option A Burning

Option B Feeding
Option C Handling

Option D Storage
Answer B

Question The following is not a pulverized fuel burner. 1
Option A Tangential burner
Option B Turbulent burner
Option C Cyclone burner
Option D Radial burner
Answer B

Question The process of converting coal into coke is called 1
Option A Coking
Option B Carbonization
Option C Decarbonization
Option D Isomerization
Answer B

Question Only bituminous type of coal can be coked. 1
Option A a) True
Option B b) False
Answer A

Question When coal burns in air then 1
Option A Carbon dioxide is formed
Option B Sulphur dioxide is formed
Option C Carbon monoxide is formed
Option D Hydrogen gas is formed
Answer A

Question The Chevron Corporation had to pay a huge fine for oil pollution in the — 1
Option A Equadorian rainforest
Option B Savannah grasslands
Option C Brazilian rainforest
Option D Amazon basin
Answer A

Question What are cascades? 1
Option A They are the one step separation processes
Option B They are the last part of separation processes
Option C They are an aggregation of stages
Option D They are the starting part of every separation process
Answer C

Question Countercurrent cascades are not prevalent in which process? 1

Option A Crystallization
Option B Distillation
Option C Stripping
Option D Liquid-liquid extraction
Answer A

Question Caking coal with content are used for gas manufacturer. 1
Option A high volatile matter
Option B low volatile matter
Option C high ash content
Option D high moisture content
Answer A

Question In which state does the pulverised coal burns? 1
Option A a) Gaseous
Option B b) Liquid
Option C c) Solid

Option D d) Colloidal
Answer A

Question PCRA stands for 2
Option A a. Public Conservations Research Association
Option B b. Petroleum Conservation Research Association
Option C c. Public Council of Research Association
Option D d. Partial Counting of remaining Amendment
Answer B

Question On what factors does the burning of pulverised coal depends? 1
Option A a) The calorific value of fuel
Option B b) Bulk density
Option C c) Percentage of volatile matter
Option D d) On the texture of coal
Answer C

Question How is the sizing of coal processed? 1
Option A a) By the use of measuring instruments
Option B b) By the use of computer software
Option C c) By crushing and screening
Option D d) By the mass of the coal
Answer C

Question Which of the following is a disadvantage of storing coal for a long period of time? 1
Option A a) Increase in the friability of coal
Option B b) Decrease in its ignition temperature
Option C c) Increase in its calorific value
Option D d) Increase in the proportion of fine
Answer D

Question 54.The reheating of steam is used when the vaporization pressure is . 1
Option A a) low
Option B b) high
Option C c) both when low or high
Option D d) always
Answer B

Question Deaerator is a type of open heater. 1
Option A a) true
Option B b) false
Answer A

Question Froth flotation process is used for 1
Option A a) Screening of coal
Option B b) Beneficiation of coal
Option C c) Dewatering of coal
Option D d) Mining of coal
Answer B

Question What is the main purpose for a blending of coal? 1
Option A To produce more amount of coal

Option B To produce good quality of coal
Option C To decrease the cost of coal

Option D To produce different types of coal at same time
Answer B

1
Question How do the chances of spontaneous combustion of coal can decrease?
Option A Decrease in the maturity of coal
Option B By washing the coal time to time
Option C Increase in the maturity of coal
Option D By the reducing the quantity of coal
Answer C

Question Which processes do the Rankine cycle contain? 2
Option A two isothermal and two isochoric processes
Option B two isentropic and two isobaric processes
Option C two isentropic and two isothermal processes
Option D two isothermal and two isobaric processes
Answer B

Question Which ideal process is carried out at the turbine in vapour power cycle? 1
Option A reversible adiabatic compression
Option B reversible adiabatic expansion
Option C reversible constant pressure heat addition
Option D reversible constant pressure heat rejection
Answer B

Question Which is the affecting factor for the fact that turbine work output is more than pump work input in vapour power cycle for the same pressure ration? 2
Option A specific heat added to the working fluid
Option B specific volume of working fluid
Option C both a. and b.
Option D none of the above
Answer B

Question Which of the following statement is true? 2
Option A open heater is also known as contact-type heater
Option B in an open type heater the extracted or bled steam is allowed to mix with the feedwater
Option C in a closed heater, the fluids are not allowed to mix together
Option D all of the mentioned
Answer D

Question .Which of the following is true for a closed heater? 1
Option A a) it requires a single pump regardless of the number of heaters
Option B b) it is costly
Option C c) both of the mentioned
Option D d) none of the mentioned
Answer C

Question The thermal irreversibility should be to improve the performance. 1
Option A a) reduced
Option B b) increased
Option C c) kept constant
Option D d) none of the mentioned

Answer A

ENERGY ENGINEERING: UNIT 3

1. On what aspects is precipitation calculated
a)Based on hydrological aspect
b)Based on climatic conditions
c)Based on the vegetation of the area
d)Based on weather forecast

Answer: a
Explanation: The evaporation of the water from the surfaces of river and oceans and its precipitation on the earth is known as hydrological cycle. Based on hydrological aspect the distribution of precipitation on the earth surface and beneath the earth is calculated.

2.Water evaporated is carried with the air in form of vapor known as

a)Cloud
b)Drizzle
c)Fog
d)Smoke

Answer: a
Explanation: It is the science which deals with rainfall. Water is evaporated from plants, rivers, oceans and carried with the air in the form of vapor which is known as cloud. Clouds

vary in different shape and size and they move according to winds.

3.When does vapor turn into form of water or snow?
a)Cooled below Dew point
b) At Frost point
c) When cooled Freezing point
d) When there is rise in Humidity

Answer: a
Explanation: Water is evaporated from surface of earth and stored in form of clouds. When the vapors in the atmosphere are cooled below dew point temperature, it falls in the form of water or snow depending on the atmospheric temperature.

4.What source of energy does evaporation and precipitation consists of?
a) Perennial energy
b) Gravitational energy
c) Thermal energy

d) Kinetic energy

Answer: a
Explanation: This evaporation and precipitation is a natural continuous process and therefore constitutes a perennial source of energy. Both these evaporation and precipitation come under the hydrological cycle.

4Water on the ground surface entering the soil is called _____
a)Infiltration
b)Transpiration
c)Filtration
d)Precipitation

Answer: a
Explanation: Infiltration is the process by which water on the ground surface enters the soil. Infiltration rate in soil science is a measure of the rate at which soil is able to absorb rainfall. It is measured in inches per hour or millimeters per hour.

4. The energy input to the hydrological cycle is by _____
a)Wind
b)Water c)Sun
d)Head

Answer: c
Explanation: The energy input to hydrological cycle is sun. Due to sun, water evaporates from water bodies. On cooling, the vapors form cloud which falls down in the form of rain, snow, hail etc which is known as precipitation.

5. About how much amount of precipitate is returned back to atmosphere?
a)2/3
b)1/4 c)3/4
d)1/3

Answer: a
Explanation: Precipitation includes all water that falls from the atmosphere to earth's surface in any form. About 2/3 portion of precipitation that reaches land surface is returned back to atmosphere by water surfaces, soil and vegetation.

6. Amount of rainfall which runs off the earth's land surface to form stream is used for _____
a) Flower generation
b) Back water storage
c) Pit Irrigation
d) Left through canals

Answer: a
Explanation: About 2/3 portion of rain is returned back to atmosphere and 1/3 portion is returned back by oceans. The amount of rainfall which runs off the earth's land surface to form streams and rivers is used for flower generation.

7. What is the unit of runoff _____
a) Day-sec meter
b) M^2/s
c) MM/S^2
d) Ns/m^2

Answer: a
Explanation: The unit of runoff is m^3/s or Day-second meter.
1 Day second meter = Discharge collected in catchment area at the rate of 1 m^3/s or for one day
=> 1 x 24 x 3600 = 86400 M^3/s
And Total run off is given by:
Total Run-off = Direct runoff over the land surface + Run-off through seepage.

8. Where is the catchment area situated with respect to dam?
a) Behind the dam
b) Front of dam
c) Right beneath the dam
d) Opposite to the Dam Head

Answer: a

9What do you call a graph which is plotted for discharge versus time?
a) Snow Graph
b) Hydrograph
c) Rain graph
d) Fluid graph

Answer: b
Explanation: The graph showing discharge of flowing water with respect to time for a specific time is known as hydrograph. The time period for

discharge hydrograph may be hour, day, week or month. The discharge may m¬¬3/sec or day per second meter.

10. Choose the correct sentence about information available from hydrograph among the following options?
a) The mean annual runoff or mean runoff each week of the year
b) Total volume at that instant, as the area under hydrograph indicates the force of water during the duration
c) Rate of flow at any particular time during the duration period
d) Mean runoff for each month

Answer: d

Explanation: Mean runoff for each month is available. As compared to all other option, they would be- i) The mean annual runoff or mean runoff each month of the year. ii) Total volume at that instant, as the area under hydrograph indicates the volume of water during the duration. iii) Rate of flow at any instant during the duration period.

11. What does hydrograph based on day gives?
a) Idea about flood period during the month
b) Idea of rainfall
c) Idea of draught during the year
d) Idea of scarcity of water in the upcoming year

Answer: a

Explanation: The hydrograph can be drawn taking day, month or year. The hydrograph on the basis of day gives an idea of the flood period during the month. The hydrograph on basis of month gives an idea about the dry period of the year.

12. What information does the year wise hydrograph gives?
a) Draught
b) Heavy rainfall
c) Rising cold
d) Water scarcity

Answer: a

Explanation: The hydrograph can be drawn taking Day, month or year as time axis. The hydrograph based on year wise data gives information concerning the lean or draught year. This is very essential for deciding the location and size of hydel power plant.

13. When is the Hydrograph called as a unit hydrograph?
a) When 1cm of runoff is resulted from a rain fall

b) When 3cm of runoff is resulted from rainfall
c) When 1mm of runoff is resulted from rainfall
d) When 3mm of runoff is resulted from rainfall

Answer: a

Explanation: If the rainfall distribution in the storms is similar with respect to time and area, the ordinate of each hydrograph will be proportional to volume of runoff. The unit hydrograph is a hydrograph with a volume of 1cm runoff resulting from a rainfall of specified duration and a real pattern.

14. Unit hydrograph was explained by Sherman in which year?
a) 1925
b) 1928
c) 1932
d) 1945

Answer: c

Explanation: This unit hydrograph principle was expressed by Sherman in 1932; he introduced the theory of unit hydrograph. He pointed out that all hydrographs have same time resulting from rainfalls of the given duration.

15. Hydrographs of similar rainfalls will be similar in shape.
a) True
b) False

Answer: a

Explanation: Hydrographs of various rainfalls will be similar in shape. The ordinates are proportional to the runoff volumes within a fixed duration and similar rate and a real distribution of rainfall. However, the occurrence of identical rainfall is very rare.

16What is unit hydrograph helpful in?
a) Estimating runoff from a basin
b) Estimating no of days of rain fall
c) Knowing the draught months in a year
d) In deciding the land for hydel power plant
View Answer

17. What is the theoretical number of unit hydrographs for given basin?
a) 500
b) 2900
c) 36000
d) infinite

Answer: d

Explanation: The number of unit hydrographs for a given basin is theoretically infinite. This is because there may be one unit hydrograph for possible duration of rainfall and every possible distribution pattern of rainfall in the basin.

18. Above which range should be the unit hydrographs be used?
a) Around 5000 sq km
b) Over 2500 sq km
c) Around 4000 sq km
d) Below 5000 sq km

Answer: a

Explanation: In practice, only a limited number of unit hydrographs are used for a given basin. It is also common practice to neglect the variations in rainfall distribution within the basin area. Hence it is not advisable to use unit hydrograph method for basins over 5000 sq km.

19. The unit hydrographs can be successfully applied to basin areas of what sq km?
a) 15000 sq km
b) 10000 sq km
c) 3000 sq km
d) 25000 sq km

Answer: d

Explanation: The unit hydrographs can be applied successfully to basin areas as large as 25000 sq km. provided distribution patterns are classified into different types and unit hydrographs are developed for each type it is always preferable to divide the large basin into sub-areas, utilize hydrographs for each sub area independently and combine the resulting hydrographs together.

20. The magnitude of runoff as ordinates against the corresponding percentage of time as abscissa gives _____
a) Mass duration curve
b) Load duration curve
c) Power duration curve
d) Flow duration curve

Answer: d

Explanation: The magnitude of runoff as ordinates against the corresponding percentage of time as abscissa gives Flow duration curve. If the magnitude on the ordinate is the potential power contained in the stream flow, then the curve is known as power duration curve.

21. What is DWF?
a) Deep water flow
b) Dry weather flow
c) Drawing web format
d) Dam water flood
View Answer
Answer: b

Explanation: Dry weather flow is a waste water flow in a sewer system during dry weathers with minimum filtration process while entering the ground. Insufficient flow velocities during DWF can increase retention.

22. What does CN stands for in hydrology?
a) Cyanide
b) Channel number
c) Cumulonimbus
d) Carbon nano-tube

Answer: c

Explanation: Cumulonimbus, from the Latin cumulus and nimbus, is a dense, towering vertical cloud associated with thunderstorms and atmospheric instability, forming from water vapor carried by powerful upward air currents.

23. What does ADF stand for in hydrology?
a) Automatic direction finder
b) Average daily flow
c) Average duration flow
d) Annual dry flow

Answer: b

Explanation: The daily effluent flow is required to calculate the area of septic field or the length of trench requires. It is also referred as the amount of water let out of a reservoir on the daily basis as per the requirement and demand.

24. Rainfall is also known as _____
a) Precipitation
b) Condensation
c) Infiltration
d) Down pour
View Answer
Answer: a

Explanation: The rainfall is also known as precipitation, is a natural process of atmospheric vapor into water. Atmospheric vapor are nothing but clouds

which are contamination of air and water. When the temperature goes below dew point then precipitation takes place.

25. In which of the following season is evaporation loss from free water is large?
a) Winter
b) Spring
c) Autumn
d) Summer

Answer: d
Explanation: During summer, the evaporation loss from free water surface is considerably large and this evaporated water finds room in the air mass. The water holding capacity of air in the form of vapor is also considerably large in hot weather.

26. Rate of rainfall is expressed in _____
a) Centimeters
b) Millimeters
c) Meters
d) Kilometers

Answer: a
Explanation: The rate of rainfall is expressed in centimeters of water during a given period of time. One centimeter rainfall is the quantity of water collected on a certain area due to rainfall which becomes one centimeter in height.

27. Average annual rainfall ranging to dessert to hilly regions would be

a) 1100cm
b) 2500cm
c) 845cm
d) 500cm

Answer: a
Explanation: The rainfall varies widely from one part of the world to another, ranging from desert regions to the hilly regions where the average annual rainfall may be over 1100cm. in some regions, the seasonal variation is very slight and monthly rainfalls are relatively uniform.

28. The annual rainfall at any given station varies from _____
a) month to month
b) weekly basis

c) year to Year
d) quarterly

Answer: c
Explanation: The annual rainfall at any given station varies irregularly from year to year. The range of this variation marks the reliability of the rainfall and has great importance in the design of storage reservoirs.

29. Intensity of rainfall is measured by_____
a) Continuously recording gauge
b) Anemometer
c) Hydrometer
d) Seismometer

Answer: a
Explanation: The intensity of rainfall is expressed as an amount of precipitation in a stead period. During heavy rainstorm the intensity of rainfall varies widely from minute to minute and can be measured only with a continuously recording gauge.

30. The relation between the area of rainstorm and its average intensity is used in assessing _____
a) Amount of water
b) Amount of rain
c) Amount of wind
d) Amount of duration of rain

Answer: b
Explanation: The relation between the area of rainstorm and its average intensity is used in assessing the amount of rain which may be expected to fall upon a catchment area within a given period. The intensity of rainfall is equally important in the design of spillways during heavy rain periods.

31. The intensity of rainfall is given by _____
a) I = R/(T+C)
b) I = R/(T×C)
c) I = (T×C)/R
d) I = (T+R)/C

Answer: a
Explanation: The intensity of rainfall is given by, I = R/(T+C)Where, I = intensity in inches/hr.
T = Duration of rain storm in hours
R & C = these are constants quoted by different authorities for different

areas of world.
The intensity also depends on the area selected for the measurement.

32. In what way are all the precipitations measured?
a) Vertical depth
b) Horizontal area
c) Width of area
d) At slope

Answer: a
Explanation: All forms of precipitation are measured on the basis of vertical depth of water which would accumulate on the level surface if all the precipitation remained where it fell. The rainfall is usually measured with rain gauges.

33. How many types of rain gauges are there?
a) 2
b) 3
c) 4
d) 5

Answer: a
Explanation: There are two types of rain gauges. They are Non-recording type and recording type. Non-recording type do not record the depth of rainfall but only collect the amount of rainfall and recording type records the depth of rainfall in mm or cm.

34. Movement and filtering of fluid from porous material is called as

a) Percolation
b) Infiltration
c) Transpiration
d) Precipitation
View Answer
Answer: a
Explanation: Percolation refers to movement and filtering of fluid from porous material. Usually the water which falls on the ground is filtered into the earth surface and is stored under the surface of earth. And this water also improves the ground fertility.

35. Where are funnel and receiver in Non-recording type placed?
a) Inside a Metal case
b) On top of the equipment
c) Below the base of equipment

d) In between the metal case
View Answer

Answer: a
Explanation: The non-recording gauge usually consists of a standard funnel discharging into a receiver large enough to hold the maximum possible day's rainfall. The funnel and receiver are placed in a metal casing with suitable packing.

36. The base of the non-recording type rainfall is permanently fixed in the concrete block.
a) True
b) False

Answer: a
Explanation: The base of the gauge is permanently fixed into a concrete block at a site where rainfall is to be measured. The precaution is taken during fixing, to level perfectly. The gauge is fixed in the block in such a way that the top of the gauge will be 30 cm above the natural surface level.

37. Which gauge gives the permanent record of rainfall?
a) Recording gauge
b) Non-recoding gauge
c) Copper daily gauge
d) Plastic gauge

Answer: a
Explanation: These are rain gauges which can give a permanent, automatic rainfall record in the form of a pen mounted on a clock driven chart. From the chart intensity or rate of rainfall in cm per hour. The recording is done by an attached siphon.

38. The drum situated in recording type makes one rotation for how many hours?
a) 4 hours
b) 24 hours
c) 6 hours
d) 12 hours

Answer: b
Explanation: The rotating drum is kept rotating continuously with the help of electric motor. The drum makes generally one rotation during 24 hours. On the rotating drum the graph paper is placed throughout its rotation the recording is made.

39. Cusec is_____
a) A unit of flow equal to one cubic feet per sec
b) A unit of flow equal to one centimeter cube per sec
c) A unit of flow equal to one meter per sec
d) A unit of flow equal to one cubic foot per sec

Answer: a
Explanation: Cusec is a unit of flow especially water which is equal to one cubic feet per sec. And there is also use of Cumec which is one cubic meter per second. One cubic feet per second is equal to 28.317 liters per second.

40. Find the power available if overall efficiency of plant is 80%, flow rate is 4.42cumecs and head 400m?
a) 6.52MW
b) 8.18MW
c) 11.255MW
d) 13.875MW

Answer: d
Explanation: Power available:
$P = wQHn_o \times 10^{-3}$ KW
$= 9810 \times 4.42 \times 400 \times 0.8 \times 10^{-6}$ MW P = 13.875MW.

41. What would be the pondage factor for if hydropower plant is used for 10 hours?
a) P.F = 2.4
b) P.F = 1.2
c) P.F = 20
d) P.F = 0.4166

Answer: a
Explanation: Pondage factor = T1/T2 = (Total number of hours in one day)/(Total number of hours plant is running)
P.F = 24/10 = 2.4.

42. Determine the capacity of hydro power plant to be used 10 hours peaking plant assuming daily flow in a river to be constant at $20m^3/s$. and overall efficiency is 80%?
a) 1.8835 MW
b) 5.5 MW
c) 3.25 MW

d) 1.0 MW

Answer: a
Explanation: Capacity of plant:
$P = wQHn_o \text{ X } 10^{-3}$ KW
$P = 9810 \text{ X } 20 \text{ X } 12 \text{ X } 0.80 \text{ X } 10^{-6}$
= 1.8835 MW.

43. Determine the flow rate of water, if the catchment area of hydroelectric power is 2500 km^2, with an average rainfall of 160cm. the percolation and evaporation losses account for 19%?

a) 9639.8 M^3/s
b) 42.8 M^3/s
c) 859.63 M^3/s
d) 2342 M^3/s

Answer: a
Explanation: Amount of water available for power generation, $Q_a = A \text{ X } H \text{ X } (1-y)$
$= 2500 \text{ X } 10^6 \text{ X } 160/100 \text{ (1-0.19)}$
$= 3.04 \text{ X } 10^{11} m^3$
Flow rate of water,
$Q = Q_a/(365 \text{ X } 24 \text{ X } 60 \text{ X } 60)$
$= (3.04 \text{ X } 10^{-6})/(365 \text{ X } 24 \text{ X } 60 \text{ X } 60) = 9639.8 \text{ } M^3/s.$

44. Determine the power developed, IF given data is H = 150m, $n_g = 0.91$, $n_t = 0.86$ and Q is 9639.8?
    a) 74MW
    b) 75MW
    c) 76MW
    d) 78MW

Answer: a
Explanation: Power developed = $wQHn_o \text{ X } 10^{-3}$ KW
$= 9810 \text{ X } 9639.8 \text{ X } 0.86 \text{ X } 0.91 \text{ X } 10^{-6}$ MW
= 74 MW.

45. Determine the pondage factor if the plant is working at peak time of 16 hrs?

a) 1.5
b) 0.75
c) 2.5
d) 0.3

Answer: a
Explanation: Pondage factor = T1/T2 = (Total number of hours in one day)/(Total number of hours plant is running)
P.F = 24/16 = 1.5.

Find out the total flow volume in day sec meter for the average daily stream flow for 7 days?

Days	Mean daily flow
1	100
2	300
3	200
4	120
5	50
6	30
7	20

820 day sec meter
b) 95 day sec meter
c) 200 day sec meter
d) 524 day sec meter

Answer: a
Explanation: Total flow volume for 7 days:
= 24 X 3600 X (100+300+200+120+50+30+20)
= 70848 X 10^3 m^3
= 70.848 million m^3
= 70848 X 10^3/86400
= 820 day sec meter.

46. Determine the pondage factor if the plant is working at time of 8 hrs?
a) 2.5
b) 3.8

c) 1
d) 3

Answer: d
Explanation: Pondage factor = T1/T2
= (Total number of hours in one day)/(Total number of hours plant is running)
P.F = 24/8 = 3.

What AEP stand for in hydrology?

a) Annual exceedance probability
b) Annual energy production
c) Annual exceedance period
d) Automatic engagement panel

Answer: a
Explanation: Annual exceedance probability refers to the probability of a flood event occurring in any year. The probability is expressed as a percentage. The probability that a given rainfall total accumulated over a given duration will be exceeded in any one year.

47. What is the volume of rainfall in day sec-meters if 6.5cm rainfall occurs over an area of 2400 sq.km?

a) 1805.56 day sec meter
b) 1225 day sec meter
c) 895 day sec meter
d) 1555.22 day sec meter

Answer: a
Explanation: Total rainfall

$$= 2400 \text{ X } 10^6 \text{ X } \frac{6.5}{100} \text{ cu. m ..... (Cubic meters)}$$

$$= 156 \text{ X } 10^6 \text{ m}^3$$

$$\text{Rain fall in day-sec-meters} = \frac{156 \text{ X } 10^6}{86400} = \underline{1805.56 \text{ day-sec-meter}} \text{.... (86400 is 1 c}$$

48.A lake behind a dam has a capacity of 30000km^3-m approximately. For how many days would this water supply be sufficient to a city of
10^6 populations if daily requirement per person is 500 liters?

a) 60,000 days
b) 950 days
c) 25000 days

d) 8000 days

Answer: a
Explanation: Per day requirement: 500 X 10^3 liter = 500 X 10^3 m^3 Available water in the dam = 30000 X 10^6 m^3
No of days water supplied = 30000 X 10^6/500 X 10^3 = 60000 days.

49.Determine the capacity of hydro power plant to be used 8 hours peaking plant assuming daily flow in a river to be constant at 65m^3/s. and overall efficiency is 80% and head 12m?
a) 6.1214 MW
b) 5.5 MW
c) 31.25 MW
d) 22.0 MW

Answer: a
Explanation: Capacity of plant:
P = $wQHn_o$ X 10^{-3} KW
P = 9810 X 65 X 12 X 0.80 X 10^{-6}
= 6.1214MW.

50.A hydel plant is supplied from a reservoir of 5 X 10^6 m^3 capacity at a head of 75m. Determine the number of electrical units produced (KWh) during the year if the load factor is 0.6 and overall efficiency of generation is 72%?
a) 441.45MWh
b) 300.22MWh
c) 235MWh
d) 182MWh

Answer: a
Explanation: The power capacity of plant in KW is given as P = mgH/1000 X n{overall}
= (5 X 106 X 1000 X 9.81 X 75 X 0.72) / (365 X 24 X 3600 X 1000)
= 83.99Kw
Energy produced in kWh = P X Load factor X (365 X 24)
= 83.99 X 0.6 X 365 X 24
= 4441451.44kwh
= 441.45 Mwh.

51. The graph of the cumulative values of water quantity against time is known as _____
a) Flow curve
b) Power curve

c) Mass curve
d) Load curve

Answer: c

52. Explanation: The graph of the cumulative values of water quantity against time is known as mass curve. A mass curve of the hydrograph which expresses the area under the hydrograph from one time to another.

Water gets polluted by submerged vegetation mineral.

a) True
b) False

Answer: a

Explanation: Water gets polluted by submerged vegetation mineral deposits, presence of algae, Leaves, twigs, logs under water decay and generates bad smelling gases. Thermal stratification and depletion of oxygen in lower strata generate harmful gases such CO_2 which pollute the water.

53. Water containing H_2S, CO_2 and CH_2 are less corrosive to dam structure.

a) True
b) False

Answer: b

Explanation: Water containing H_2S, CO_2 and CH_2 are highly corrosive to dam structure. H_2SO_4 formed by oxidation of H_2S attack the cement and disintegrate the concrete. These gases increase the solubility of soil and rocks. Structures, metallic piping and penstock are also affected.

54. Presence of Corrosive gases like H_2S and SO_2 affect the voltage drop.

a) True
b) False

Answer: a

Explanation: Presence of Corrosive gases like H_2S and SO_2 does affect the voltage drop at brush contacts in generator leading to poor commutation.
Silver contacts of relays get blackened and lead to high contact resistance and failure of relay occurs.

55. Which among the following reduces the capacity of reservoir and causes rapid erosion of turbine blades?

a) Contamination of highly corrosive material
b) Sedimentation effect
c) Submerged vegetation

d) Solid contamination

Answer: b
Explanation: Sediments in the aquatic ecosystem are analogous to soil in the terrestrial ecosystem as they are the source of substrate nutrients, and micro- and macro flora and -fauna that are the basis of support to living aquatic resources.

56. What is the basic requirement of hydroelectric power station?
a) Reservoir
b) Turbine
c) Power house
d) Penstock

Answer: a
Explanation: The basic requirement of a hydroelectric power station is a reservoir where large quantity of water is stored during flood season and used during dry season. The reservoir is generally built of constructing dam across river.

57. The water from is drawn by the _____
a) Canal
b) Hose
c) Stream
d) Penstock

Answer: a
Explanation: The water from reservoir is drawn by the fore bay through an open canal or tunnel. The water from fore bay is supplied to water turbine through penstock which is located at much lower level than the height of water in reservoir.

58. What is used to prevent the entry of debris into turbine?
a)Wiper
b)Forebay
c)Trashrack d)Filter

Answer: c
Explanation: Trash rack is used to prevent the entry of debris which might damage the Wicket gate and turbine. It is a wooden or metal structure and is supported by masonry, that prevents waterborne debris from entering into penstock which than connects to turbine.

59.A pipe between surge tank and prime mover is known as?

a) Canal
b) Draft tube
c) Penstock
d) Hose

Answer: c
Explanation: A pipe between the surge tank and prime mover is known as penstock. It is made of steel through reinforced concrete. Cast iron is used for small plants. The intake of penstock at the dam or fore bay of canal should be positioned such that it always provides adequate water even at low level.

60. Which type of penstock is used in cold climates?

a) Buried penstock
b) Covered penstock
c) Open penstock
d) Exposed penstock

Answer: a
Explanation: Buried penstocks are used in cold climates where freezing is expected. types of penstocks have shorter life period. A buried penstock will not be subjected to the problem of harmonic vibrations sometimes associated with the traditional penstock.

61. Which type of penstocks is less expensive?

a) Buried penstock
b) Covered penstock
c) Open penstock
d) Exposed penstock

Answer: d
Explanation: Exposed penstocks are less expensive and have a longer life. Their inspection and maintenance is easier. Penstocks are not covered because exposed pipes are easily accessible. The water flow rate is 2, 4, and 7 m/s in low, medium and high head power plants respectively.

62.A safety valve for a dam to discharge major floods is called?

a) Spillway
b) Penstock
c) Fore bay
d) Canal

Answer: a
Explanation: Spillway is a safety valve for a dam to discharge major floods without damage to dam. It keeps the reservoir level below some predetermined maximum level. Spillway ensures that water does not overflow and damage or destroy the dam.

63. What is introduced between the dam and power house?
a) Penstock
b) Draft tube
c) Prime mover
d) Surge tank

Answer: d
Explanation: Surge tank is introduced between the dam and power house nearest to the power house and preferably on the high ground to reduce the height of tower to provide better regulation of water pressure in the system during variable load condition.

64. What type of Hydro plant is it if the Plant head is above 100m?
a) High head hydro-plant
b) Medium head hydro-plant
c) Low head hydro-plant
d) Base load hydro-plant

Answer: a
Explanation: If the head of water available is above 100m, the plant is known as a high head plant. IN this head, water available for producing electricity is very high and it can extend to 1000 meters. These are most commonly constructed hydro plants.

65. Which type of hydro plant is it if the head of a hydro plant is 30 – 100m?
a) High head hydro-plant
b) Medium head hydro-plant
c) Low head hydro-plant
d) Base load hydro-plant

Answer: b
Explanation: If the water available is more than 30m but less than 100m, than this type of plant is known as medium head plant. Water stored in fore bay is conveyed to the turbine through penstocks. In these plants the river water is tapped off to a fore bay on one bank of rive.

66. Low head hydro plant is also known as _____
a) Canal power plant

b) Medium head hydro-plant
c) Run-off river hydro-plant
d) Base load hydro plant

Answer: a
Explanation: Low head hydro electric power plant is also known as canal power plant. The dam in this type of power plant is of very small head may be even few meters only. The low head type of power plants cannot store water.

67. Which plants supply the peak load for the base power plants?
a) Mini hydel plants
b) Pump storage power plants
c) Low head plants
d) Run-off river power plants

Answer: b
Explanation: Pumped storage plants supply the peak load for the base power plants and pump all or a portion of their own water supply. The plant contains a tail water pond and a head water pond connected by a penstock.

68. Which plants are used with steam and IC engines?
a) Pumped storage plants
b) Mini hydel plants
c) Low head Hydel plant
d) Run-off river plants

Answer: a
Explanation: Pumped storage plants can be used with hydro, steam and IC engines. The generating pumping unit is at the lower end. During off peak hours some of the surplus electric energy generated by the base plant is utilized to pump water from tail water pond into the head water pond.

69. Which type of turbines does modern hydro power plant use?
a) Kaplan turbine
b) Francis turbine
c) Pelton wheel
d) Cross flow turbine

Answer: b
Explanation: Modern power plants use Francis turbine. Francis turbine is a water turbine developed by James Francis. It is an inward flow reaction turbine that combines radial and axial flow concepts. These are primarily used for electric production.

70. Which type of hydro power plant can be with or without pondage?
a) Mini hydel plants
b) Pump storage power plants
c) Low head plants
d) Run-off river power plants

Answer: d
Explanation: Run-off river power plants can be with or without pondage. A runoff river plant without pondage has no control over river flow and uses water as it comes. The runoff river plant with pondage may supply base load power.

71The surge tank controls the water when the load on the turbine is

a) Equal
b) Decreased
c) Increased
d) Not present

Answer: b
Explanation: The surge tank controls the water when the load on the turbine decreases. The excess water is stored in the surge tank and hence the pressure variations in the penstock are taken care of preventing water hammer.

72. Which type of valves is preferred for moderate heads?
a) Butterfly valve
b) Tube valve
c) Needle vale
d) Globe valve

Answer: a
Explanation: For moderate heads butterfly valves are preferred. Gate valves are used to regulate the flow. This valve is used both as intake gate and as turbine valve. It helps inspection without dewatering the penstock line.

73. Which type of gate valves are used in high head installations?
a) Needle valves
b) Butterfly valves
c) Globe valve
d) Pinch valve

Answer: a
Explanation: Needle valves are used in high head installations. The needle

valve consists of three water filled chambers A, B and C in which hydraulic pressures can be varied. The valves are opened and closed by varying the pressures in these chambers.

74. Why has nuclear energy become an inevitable option for the development of the country?
a) Because less pollution caused by nuclear plant
b) High efficiency of nuclear energy
c) Due to acute shortage of other sources of energy
d) High cost of energy production of other sources

Answer: c
Explanation: With the acute shortage of other sources of energy viz. fossil based fuels and hydel sources the use of nuclear energy has become an inevitable option for the both developed and developing country.

75. How much amount of nuclear energy burnt is equivalent to the energy produced by 3000 tonnes of coal?
a) 1kg
b) 5kg
c) 15kg
d) 20kg

Answer: a
Explanation: The amount of heat generated by burning one kg of nuclear fuel is equivalent to the energy generated by burning 3000 tonnes of coal or 1600 tonnes of oil. The production of Nuclear energy is carried out by two methods which are nuclear fission and nuclear fusion.

76. What is the most attractive part of nuclear energy?
a) Supports countries development
b) Causes no pollution
c) Has high efficiency of energy production
d) Is available in abundance

Answer: b
Explanation: Most attractive part of nuclear energy is that it has no combustion products and under safe working conditions contributes no pollutant to air. Site selection is completely independent of geographical area.

77. Nucleus consists of two sub-particles known as?
a) Nucleotides
b) Nucleons
c) Neutrons
d) Nucleosides

Answer: b
Explanation: Atom consists of a relatively heavy, positively charged nucleus and a number of much lighter negatively charged electrons. Electrons exist in various orbits around the nucleus. The nucleus consists of two sub- particles known as nucleons.

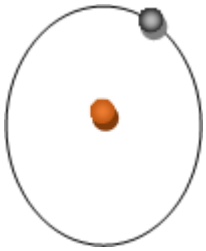
76. The atom as a whole is electrically charged.
a) True
b) False

Answer: b
Explanation: The atom as a whole is not electrically charged it is actually electrically neutral in its state. The electric charge on the proton is equal in magnitude but opposite in sign to that of electron, the number of protons is equal to the number of electrons in the orbit.

77. On which law is the nuclear energy explained?
a) Einstein's law
b) Newton's law
c) Rutherford law
d) Mendeleev law

Answer: a
Explanation: The nuclear energy is explained the basis of Einstein's law, one atom may be transformed into another by losing or acquiring some of the above sub-particles. This results in mass change Δm and enormous amount of energy is released (or absorbed). According to Einstein's law,
$\Delta E = \Delta mc^2$
Where, c=light of speed.

78. Identify the element by its Atomic structure.



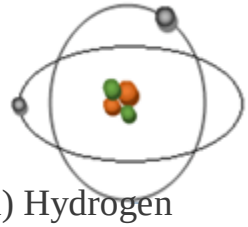
a) Helium

b) Hydrogen
c) Carbon
d) Oxygen

Answer: b
Explanation:

Most of the mass of the atom is in nucleus. The red dot is a proton it has positive charge of 1 unit, and black one is an electron, which has a negative charge of -1. There is only one orbital for hydrogen.

78. Identify the element by its atomic structure?



a) Hydrogen
b) Helium
c) Carbon
d) Oxygen

Answer: b
Explanation:

The masses of three atomic sub-particles are, Neutron mass, m_n = 1.008665 amu
Proton mass, m_p = 1.007277 amu Electron mass,
m_e = 0.0005486 amu.

79. Number of protons in the nucleus is called _____
a) Atomic number
b) Mass number
c) Electric charge
d) Periodic number

Answer: a
Explanation: Number of protons in the nucleus is called atomic number Z. it is unique for each chemical element, and represents both the number of positive charges on the central massive nucleus of the atom and the number of electrons in orbits around the nucleus.

80. The total number of nucleons in the nucleus is called _____
a) Atomic number

b) Mass number
c) Electric charge
d) Periodic number

Answer: b
Explanation: The total number of nucleons in the nucleus is called the mass number A. Nuclear symbols are written as ${}_{z}X^{A}$ Where X is chemical symbol. The masses of atoms are compared on a scale in which an isotope of ${}_{6}C^{12}$ has a mass of exactly 12.

81. To disrupt a nucleus and separate in into its component nucleons, energy must be supplied from outside and this energy is called?
a) Bonding energy
b) Kinetic energy
c) Binding energy
d) Nuclear energy

Answer: c
Explanation: To disrupt a nucleus and separate in into its component nucleons, energy must be supplied from outside and this energy is called Binding energy. The nuclear force acts only when the nucleons are very close to each other and binds them into compact stable structure.

82. The net neutrons produced per initial neutron accounting for all possible losses is called?
a) Bombardment
b) Half life
c) Multiplication factors
d) Covalent bond

Answer: c
Explanation: The net neutrons produced per initial neutron accounting for all possible losses is called multiplication factor (K). If: K < 1 = system is subcritical.
K = 1 = System is critical.
K > 1 = system is super critical.

83. What is the time during which one half of a number of radioactive species decays or one half of their activity ceases?
a) Half Life
b) Super critical state
c) Semi life
d) Critical life
View Answer

Answer: a
Explanation: Half life is the time during which one half of a number of radioactive species decays or one half of their activity ceases. It is also used to characterize any type of exponential and Non-exponential decay.

84. Electrons that orbit outermost shell of an atom are called?
a) Valence electrons
b) Electrons
c) Electron Coefficients
d) Neutrons

Answer: a
Explanation: Electrons that orbit outermost shell of an atom are called Valence electrons. The outermost shell is called valence shell. The presence of valence electron can determine the element's chemical properties.

85. A covalent bond is also called as _____
a) Atomic bond
b) Metal bond
c) Molecular bond
d) Metal bond

Answer: c
Explanation: A covalent bond is also called as molecular bond, which involves sharing of electron pairs between atoms. These electron pairs are known as shared pairs or bonding pairs, when these share an electron than it is called as covalent bonding.

86. In which of the following process are Neutrons emitted?
a) Inverse beta Decay
b) Nuclear fission
c) Spontaneous Fission
d) Nuclear fusion

Answer: b
Explanation: Nuclear fission is the process in which a heavy nucleus is split into two or more lighter nuclei. This result in decrease in mass and consequent exothermic energy and emission of neutrons take place. Two to three neutrons are emitted per nucleuses which are known as fission elements.

87. Heavy nuclei must be such that they can be fissioned by neutrons of an energy such substance are called?

a) Fission fragments
b) Fission Neutrons
c) Fission species
d) Fission elements

Answer: c
Explanation: Heavy nuclei must be such that they can be fissioned by neutrons of energy such substance are called Fission species. All fission species should have long half lives so that the rate of decay is not so fast.

88. Why neutrons with lower energy should be capable of causing fission?
a) For faster reaction process
b) For sustained reaction process
c) For Safety purpose
d) In order to not waste the nuclear fuel

Explanation: Due to collisions with various nuclei, initial high kinetic energy of fission neutron decreases. Thus for a sustained reaction, eve neutrons with lower energy should be capable of causing fission. Only neutrons can result in sustained reaction as two or three neutrons are released for each one absorbed by fission.

89. What happens when a neutron is absorbed by a nucleus of an atom of U^{235}?
a) Mass number of atom increases
b) One electron is let out
c) U^{236} isotope is formed
d) Nucleus becomes unstable

Answer: c
Explanation: When a neutron is absorbed by a nucleus of an atom U^{235}, a U^{236} isotope is formed. This isotope is highly unstable which lasts for one millionth of a second and splits into two equal parts releasing energy of 200MeV.

90. Who invented nuclear fission?
a) Rutherford
b) Hans Bethe
c) Otto Hahn
d) Marie Curie

Answer: c
Explanation: Nuclear fission of heavy metals was discovered by German

Otto Hahn on December 17, 1938 and was explained theoretically by Lise Meitner and her nephew Otto Robert Frisch on 1939. Frisch named Frisch names the process by analogy with biological fission of living cells.

91. Atoms of different chemical elements that have the same number of nucleons are called as?
a) Isobars
b) Isotones
c) Isomers
d) Isotopes

Answer: a
Explanation: Atoms of different chemical elements that have the same number of nucleons are called as isobars. The term isobar was suggested by Alfred Walter Stewart in 1918. It is derived from Greek word 'isos' meaning EQUAL and 'baros' meaning WEIGHT.

92Most of the energy released in fission process is in process of _____
a) Kinetic Energy
b) Thermal Energy
c) Light Energy
d) Heat Energy

Answer: a
Explanation: Most of the energy released is in the form of kinetic energy and is absorbed by fission products. The fission products formed are fission fragments, neutrons and electromagnetic or gamma radiation. As the fragments collide, the kinetic energy is converted into heat energy.

93. Combining of two light nuclei of low mass to produce a heavy nucleus is called _____
a) Nuclear fusion
b) Nuclear fission
c) Spontaneous fission
d) Double beta decay

Answer: a
Explanation: Nuclear fusion is the process which involves fusion of two light nuclei of low mass to produce a heavy nucleus which results in decrease of mass and release of enormous amount of energy. All atomic bombs prefer nuclear fission process.

94. What type of Reaction takes place in sun?
a) Nuclear fusion

b) Nuclear fission
c) Spontaneous fission
d) Double beta decay

Answer: a
Explanation: Nuclear fusion reaction takes place in sun as well as stars. The process is carried by proton-proton chain. The sun starts with protons, and through a series of steps, turns them into helium. Every second 600 million tons of hydrogen is converted into helium. The reaction releases tremendous amount of heat and energy.

94. How many number of nuclei of hydrogen fuse in a series of reaction involving other particles that continually appear and disappear?
a) 1
b) 2
c) 3
d) 4

Answer: d
Explanation: Four nuclei of hydrogen fuse in a series of reaction involving other particles that continually appear and disappear such as He3, nitrogen, carbon and other nuclei.
$4_1H^1 \rightarrow {}_2He^4 + 2_{+1}e^0$ (Positrons)
Mass decreases to about 0.0276amu releasing 25.7MeV. The heat liberated during this result in temperature of the order of the million degrees and sustains the succeeding reactions.

95. Why is it necessary to accelerate positively charged nuclei to high kinetic energies to cause fusion?
a) To overcome electrical repulsive forces
b) To result in high amount of energy in short period of time
c) To get the isobars and isotopes
d) To get a sustainable reaction

Answer: a
Explanation: To cause fusion, it is necessary to accelerate positively charged nuclei to high kinetic energies to overcome electrical repulsive forces. This is done by rising their temperatures to hundreds of millions of degree resulting in plasma.

96. Fusion reactions are called _____
a) Thermonuclear
b) Thermoduric
c) Thermo Uric

d) Compound reactions

Answer: a
Explanation: To eradicate repulsive forces temperature of positively charged nuclei is raised to millions of degree resulting in plasma. The plasma should be prevented from contacting the walls of the container confined for a period of time of the order of a second at a minimum density. Fusion reactions are called thermonuclear because of the higher temperature requirement to trigger and sustain the reaction.

97. Which of the following element is readily available in the ordinary water?
a) Cesium
b) Thorium
c) Deuterium
d) Astatine

Explanation: Deuterium used in fusion reaction is readily available in ordinary water (Out of 6500 molecules). Deuterium is also known as heavy hydrogen. The nucleus of deuterium is called as deuteron, Contains one proton and one neutron.

98. How is tritium made from sea water?
a) By bombarding lithium
b) By bonding with carbon
c) By bombarding Beryllium
d) By reacting with oxygen

Answer: a
Explanation: Tritium is made by seawater by bombarding with lithium. Lithium is a chemical element with Atomic number: 3 and Mass number: 6.941 u ± 0.002 u. Because of its relative nuclear instability, lithium is less common in the solar system.

99. Which nuclear fuel is usually used in thermal nuclear reactor to create fission?
a) U^{234}
b) U^{235}
c) U^{236}
d) U^{237}

Answer: b
Explanation: In a thermal nuclear reactor the fission induced by neutrons using a fuel isotope U^{235} is one of the several isotopes used in nuclear power

generation. Fuel isotopes which are capable of being fissioned by thermal neutrons are called fissile's.

100. $_{90}Th^{232}$ is fertile isotope produced by fission.
a) True
b) False

Answer: a
Explanation: $_{90}Th^{232}$ is a fertile isotope produced by nuclear fission. $_{90}Th$ has 6 naturally occurring isotopes, none of these isotopes are stable; however, one isotope, ^{232}Th is relatively stable, with a half life of 1.405×10^{10} years, considerably longer than the age of earth.

101. Which parts function is to reduce the energy of fast neutrons to thermal neutrons in nuclear power plant?
a) Moderator
b) Coolant circulator
c) Control rods
d) Shielding

Answer: a
Explanation: Function of moderator is to reduce the energy of fast neutrons to thermal neutrons. Due to high energy of fission neutrons relative to that required to trigger another fission event their probability of interacting with U^{235} is small.

102. What makes the best moderators in nuclear power plant?
a) Material with low atomic number
b) Materials with low atomic mass
c) Materials with high atomic number
d) Materials with high mass number

Answer: a
Explanation: The moderator slows down the neutrons to thermal energies by collision with inert atoms (scattering). Speed of the neutrons is reduced within a small number of collisions as the moderator possesses a high scattering cross section. Materials with low atomic mass number make best moderators.

103. Select the desirable property of a moderator?
a) Moderator should absorb neutrons but slow down the neutrons as early as possible
b) It should have low thermal conductivity for better heat transfer
c) It shouldn't be chemically unstable

d) It should have low resistance to corrosion

104. What is used in nuclear reactor as a cooling method/device?
a) Coolant
b) Water jackets
c) Air cooler
d) Air vents

Answer: a
Explanation: The coolant is used and its function is to remove the heat released by fission. The coolant should have high specific heat, high conductivity, good chemical stability, good pumping characteristics and low neutron absorption cross section. Coolant can either be liquid or gas.

105. Control rods are made of _____
a) Cesium
b) Cadmium
c) Tin
d) Gallium

Answer: b
Explanation: Control rods are made of cadmium or boron or Hafnium. They have huge neutron absorption cross sections. The control rods are lowered or raised in the reactor core. Control rods are used in control rod assemblies and inserted into the guide fuels within a fuel element.

106. Reactor power is directly proportional to neutron density.
a) True
b) False

Answer: a
Explanation: Reactor power is directly proportional to neutron density, lowering the control rods will remove neutron from the reactor core and will decrease the power and reaction rate and raising the control rods will increase the power and rate.

107. What types of rays are trapped by shielding?
a) Gamma rays
b) Beta rays
c) X-rays
d) IR rays

Answer: a
Explanation: Shielding prevents the passage of radiation to the outside of the reactor. The primary shield prevents the leakage of neutron and gamma radiation present in the cooling circuits due to activation of coolant as passes through the core.

108. Shield is made of _____
a) Iron Metal enclosure
b) Concrete and water
c) Ceramics walls
d) Copper metal

Answer: b
Explanation: Shield is frequently constructed in layers or heavy and light material like concrete and water. Shields for external circuit where only gamma radiation may be present is made up of steel, lead, polyethylene, concrete.

108. Which of the following part in a nuclear reactor minimizes the neutron leakage?
a) Shield
b) Control rods
c) Reflector
d) Moderator

Answer: c
Explanation: Function of the reflector is to minimize the neutron leakage by reflecting them back into the reactor. The material used for reflector is same as that used for moderator. It scatters the neutrons that leak from core and returns the neutrons back into core by reflecting them.

109. In which of the following reactor is fission caused by slow or thermal neutrons?
a) Thermal reactor
b) Burner reactor
c) Fast reactor
d) Breeder reactor

Answer: a
Explanation: A thermal reactor is a nuclear reactor that uses slow or thermal neutrons. Most nuclear power plants are thermal reactors and use neutron moderator to slow neutrons until they approach the average kinetic energy of the surrounding particles. Fission is caused by slow or thermal neutrons.

110. Which reactor has no moderator and its core size is less?
a) Fast reactor
b) Burner reactor
c) Thermal reactor
d) Breeder reactor

Answer: a
Explanation: A fast reactor is a category of nuclear reactor in which the fission chain reaction is sustained by fast neutrons, as opposed to thermal neutrons used in thermal neutron reactors. The fission process is caused by fast neutrons and the reactor has no moderator and the core size less.

111. In which reactor is fertile material converted into initial fissile material?
a) Breeder reactor
b) Fast reactor
c) Burner reactor
d) Thermal reactor

Answer: a
Explanation: A breeder reactor is a nuclear reactor that generates more fissile material than it consumes. In this reactor fertile material is converted into initial fissile material. For e.g. natural uranium is the fuel, thorium is converted into U^{233}.

112. Which reactor produces only heat?
a) Burner reactor
b) Breeder reactor
c) Thermal reactor
d) Intermediate reactor

Answer: a
Explanation: Burner reactor is a type of reactor using U^{235} as fuel. Enriched uranium is used to increase efficiency. To prolong the fission reaction, fast neutrons are slowed down with a moderator and the rate of reaction is adjusted by control rods which can absorb neutrons. Some neutrons react to form plutonium, but in smaller amounts than the original uranium, and produces only heat as a product.

113. PWR stands for _____
a) Power
b) Partially weathered rock
c) Pressurized water Reactor
d) Packaging waste regulations

Answer: c
Explanation: PWR stands for pressurized water reactor. A PWR power plant consists of two loops in series. One is the coolant loop called primary loop and other is the water steam or working fluid loop. Pressurized water reactor falls under the category of light water reactor.

114. What does the top of the pressurizer in pressurized water reactor consists of at primary system pressure?
a) Steam
b) Air
c) Water
d) Fluids

Answer: a
Explanation: The pressurizer is a pressure vessel with a heater at the bottom and water spray at the top. The top of the pressurizer is filled with steam at primary system pressure. If the primary loop pressure drops, the heater is energized to increase the steam content in the pressurizer and thus increases the pressure of primary cooling system.

115. Select the incorrect statement which supports PWR.
a) Water is used as coolant
b) PWR is stable in operation
c) Uses natural fuel
d) PWR has positive power demand coefficient

Answer: c
Explanation: PWR uses enriched fuel making the reactor more compact in size. And due to high negative temperature coefficient, a PWR is stable.
Water is used as the coolant. It does have positive power demand coefficient and responds greatly to more power demand.

116. Select the incorrect statement about PWR.
a) High primary circuit pressure requires a strong pressure vessel
b) Corrosion is less in PWR
c) During fuel charging in PWR, the reactor has to be shut down at least for a month
d) PWR results in uneven heating

Answer: b
Explanation: Presence of high temperature and high pressure water, the corrosion is severe. This means use of stainless steel adds to further costing. When γ- radiations pass through the pressure vessel it results in uneven heating which induces thermal stresses on vessels.

117. LWR stands for _____
a) Lower water reactor
b) Line water reactor
c) Liquefied water reactor
d) Light water reactor

Answer: d
Explanation: The light water reactor is a type of thermal-neutron reactor that uses normal water, as opposed to heavy water, as both its coolant and neutron moderator – furthermore a solid fissile element is used as fuel. These are most common type of Thermal-neutron reactors.

118. In which reactor is the coolant in direct contact with the heat producing nuclear fuel?
a) Fast breeder reactor
b) Pressurized water reactor
c) Boiling water reactor
d) Heavy water reactor

Answer: c
Explanation: In boiling water reactor, the coolant is in direct contact with the heat producing nuclear fuel and boils in the same compartment in which the fuel is located. The reactor pressure is maintained at 70bar. The coolant thus serves the triple function of coolant, moderato and working fluid.

119. How many types of Boiling water reactor cycles are there?
a) 2
b) 3
c) 4
d) 5

Answer: b
Explanation: There are three different types of BWR cycles commonly used: Single cycle internal circulation: This system uses internal recirculation system to generate power ranging from 50- 100 MW.
Single cycle forced circulation: This type uses a forced circulation system using a circulation system using a circulating pump. The heat in the reactor is used to generate steam.
Dual cycle forced circulation: this arrangement has two cycles, steam cycle and gas cycle.

120. Which country invented CANDU heavy water reactor?
a) Canada
b) Germany
c) Russia
d) Bolivia

Answer: a
Explanation: The CANDU is a Canadian pressurized heavy water reactor design used to generate electric power. Heavy water nuclear reactors and light water nuclear reactors differ in how they create and manage the complex physics of nuclear fission or atom-splitting which produces the energy and heat to create steam to drive generators.

121. In which of the Following reactor is heavy hydrogen isotope H-2 is used as moderator?
a) Boiling water reactor
b) Pressurized water reactor
c) Candu reactor
d) Thermal reactor

Answer: c
Explanation: Heavy water composed of heavy hydrogen isotope H-2 is used as a moderator and coolant in some power and research reactors. These reactors use heavy water as a moderator and primary coolant and light water as secondary coolant.

122. CANDU stands for _____
a) Canadian Natural Darmstadtium Uranium
b) Canadian Natural Deuterium Uranium
c) Canadian Natural Dubnium Uranium
d) Canadian Natural Dysprosium Uranium

Answer: b
Explanation: The CANDU, for Canada Deuterium Uranium, is a Canadian pressurized heavy water reactor design used to generate electricity. The acronym refers to its deuterium oxide (heavy water) moderator and its use of (originally natural) Uranium fuel.

123. Which reactor consists of both fertile and fissile material?
a) Fast breeder reactor
b) Pressurize water reactor
c) Boiling Water reactor

d) Converter reactor

Answer: a
Explanation: If the reactor produces more fissionable material than it consumes, it is fast breeder reactor. The breeder fuel consists of both fertile and fissile material. The number of neutrons released is sufficient to propagate the fission reaction and to produce more fissionable material by conversion of fertile isotopes to fissile isotopes.

124. What is acronym of LMFBR?
a) Liquid molecular fast boiling reactor
b) Liquid metal fast breeder reactor
c) Liquefied metal fast boiling reactor
d) Liquid metal fast boiling reactor

Answer: b
Explanation: LMFBR stands for Liquid metal fast breeder reactor. The fuel consists of 80% by weight of UO_2 by weight of PuO_2 in small diameter stainless steel clad tubes operating at temperature of $670^oC – 700^oC$.

125. GCFBR stands for _____
a) Gas conditioned fast breeder reactor
b) Gas cooled fast breeder reactor
c) Gas conditioned fast boiling reactor
d) Gas cooled fast breeder reactor

Answer: b
Explanation: The GCFBR stands for Gas cooled fast breeder reactor; it is cooled by helium gas at 85bar. Also helium doesn’t become radioactive under neutron bombardment AND hence secondary coolant is not needed.

126. Using Helium gas in GCFBR has many advantages.
a) True
b) False

Answer: a
Explanation: Using helium as coolant posses less severe metallurgical and safety problems. Heat transfer coefficient of helium is much superior than sodium with artificial roughening of fuel rod surfaces. Low doubling time as compared to sodium cooled reactors.

127. Which reactor uses orthometaerhenyl and paratherphenyl as coolant and moderator?
a) Liquid metal fast breeder reactor

b) Gas cooled fast breeder reactor
c) Organic substance cooled reactor
d) CANDU Heavy water reactor

Answer: c
Explanation: Organic substance cooled reactor uses enriched uranium as fuel and a mixture of orthometaterhenyl and paratherphenyl as coolant and moderator, and boron control rods, generating 11.4 MW capacities with an overall efficiency of 25%.

128. Nuclear plant is located near the area where cooling water is available.
a) True
b) False

Answer: a
Explanation: Some of the major factors to locate a nuclear station considered are, Availability of cooling water, transportation facilities, Distance from load centre, safety, radioactive waste, disposal facility and foundation requirement.

129. What is the major problem in nuclear plants?
a) Drawing out energy
b) Fusion of particles
c) Disposal of nuclear waste
d) Handling of fuel

Answer: c
Explanation: One of the major problems in the nuclear power plant is the disposal of waste products which are highly radioactive. They emit large quantities of γrays and these high energy γ rays destroy all living matter through which pass.

130A 400 MW nuclear power station would produce a equivalent radium of

a) 100 tons daily
b) 1000 tons daily
c) 500 tons daily
d) 10 tons daily

Answer: a
Explanation: The radio-active products of a 400MW power station would be equivalent to 100 tons of radium daily and the radioactive effect of this plant

product if exposed to atmosphere would kill all the living organisms within the area of about 100 sq miles.

131. How are moderate active solid wastes disposed?
a) Buried underground
b) Buried under sea
c) Sent to outer space
d) Left out in streams or rivers

Answer: a
Explanation: In a nuclear fuel cycle, the solid, liquid and gaseous radioactive wastes are produced at different stages. These radioactive wastes must be disposed off in such a manner that there is no hazard to the human and plant life. Moderate active solid wastes are buried in the ground.

132. Moderate liquid nuclear wastes are disposed into _____
a) Deep pits
b) Buried underground
c) Left into rivers
d) Left into deep oceans

Answer: a
Explanation: Moderate liquid wastes after preliminary treatments are discharged in deep pits or day well from which they sweep out into the surrounding. Certainly liquid wastes are mixed with some kind of other chemical in order to lower their radioactivity.

133. Which type of disposal of nuclear waste is cheapest and easiest method of all?
a) Ground
b) Air
c) Space
d) Water

Answer: a
Explanation: This is one of the easy and cheapest methods of disposal because soil absorbs radioactive material easily. This disposal is suitable mostly in areas of low rainfall at points which are high above the ground water level.

134. How are active liquids of nuclear waste disposed?
a) Stored in concrete tanks and buried underground
b) Stored in concrete tanks and buried in sea

c) Mixed with other chemicals and left into free atmosphere
d) They are reused and burnt away in gaseous fumes

Answer: a
Explanation: Active liquids are kept in concrete tanks and these tanks are buried in the ground till their decay of radio activity. Many times the radio activity increases the temperature of the liquid waste or sometimes these liquids boil and the activity decreases with time.

135. What are the ways in which most of radio activeness is removed?
a) Infusing them with other metal
b) Neutralizing them by diluting in chemical solutions
c) Storing them
d) Segregating them into small packs

Answer: c
Explanation: Most of the radio activeness of waste is removed just by storage. The storage problem is simplified by separating cersium and strontium which are extremely radioactive. These are generally stored in tanks which are buried in ground and then disposed in to the sea after 13 years of storage.

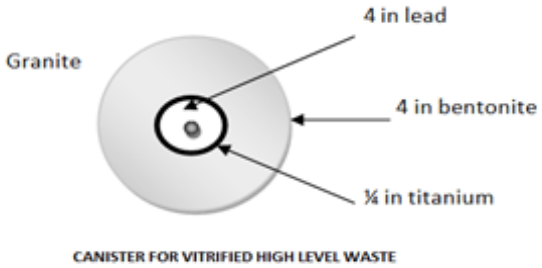
136. Can vacated coal mines be used for waste disposal.
a) True
b) False

Answer: a
Explanation: Yes, vacated coal mines can be used for waste disposal. The wastes are disposed in the salt heaps provided in the mines, because salt is a powerful absorber of radioactive emissions. It will be easy and more economical method to dispose of liquid waste by freezing.

137. How is High Level solidified nuclear wastes (HLW) stored?
a) Concrete tanks
b) Canisters
c) Packed rock salt
d) Soil bins

Answer: b
Explanation: The solidified waste is placed in canisters that are stored in holes formation for thousands of years. The solidified waste is placed in canisters that are stored in holes drilled in rock salt with a spacing of 10 m to allow efficient dissipation of energy without exceeding temperature limits of

either canister or salt. Each canister requires 100 m^2 of salt for cooling.



CANISTER FOR VITRIFIED HIGH LEVEL WASTE

138. What is the approx cost of disposing nuclear waste into sea per cubic meter?
a) 50 rs
b) 300 rs
c) 500 rs
d) 1000 rs

Answer: b
Explanation: In many places the liquid waste is disposed off to the sea through the pipes carried from the plant to the point of disposal. While disposing into the sea it should be seen that the activity level should not affect the marine life. The approximate cost of disposal by this method is 300 rs per cubic meter.

139. Absorption of radioactive element by human, affects their offspring's.
a) True
b) False

Answer: a
Explanation: Absorption of neutron or radioactive element by a tissue nucleus leads to radioactive nucleus which results change in chemical nature, mal-functioning of cell. Due to this, cell damages leading to genetic modification. Inhale of radioactive material through air, food and water result radiation hazard.

140. For how many days is radioactive solid waste kept is kept under water at 6m deep for initial cooling?
a) 15 days
b) 50 days
c) 30 days
d) 100 days

Answer: d
Explanation: It is necessary to keep the radioactive solid waste first in the water of 6m depth nearly for 100 days. It was found that after 100 days

cooling of radioactive waste of 28MW plant in water still has a radioactivity equal to million grams of radium. About 50% radioactive elements disappear during cooling.

141. What are released into biosphere from nuclear power plants?
a) Gaseous effluents
b) Waste Product
c) Smoke
d) The obtained product

Answer: a
Explanation: Under normal operation, gaseous effluents are released slowly from the power plants into the biosphere and become diluted and dispersed harmlessly. Releasing at slow rates gives it time to blow of slowly.

142. Tailings forms are the residues from _____
a) Uranium
b) Thorium
c) Cadmium
d) Boron

Answer: a
Explanation: Tailings are residues from uranium mining and milling operations. They contain low concentration of naturally occurring radioactive materials. They are generated in large volumes and are stored at the mine or mill sites.

143. LLW stands for _____
a) Low Level Water
b) Low Laser width
c) Low Level Waste
d) Loss of Levels in water

Answer: c
Explanation: Low Level Waste contains less than 10 nCi per gram of transuranium contaminants containing low but potentially hazardous concentrations of radioactive materials. These are generated in almost all activities involving radioactive materials, require little or no shielding.

UNIT NO – IV

Diesel & Gas Turbine Power Plant

1) The thermal efficiency of diesel engines is about
a) 30%
b) 15%
c) 50%
d) 70%
Answer: d
Explanation: The thermal efficiency of diesel engines is about 70%.
2) The expansion of fuel in a four stroke cycle diesel engine
a) starts at 15° after top dead centre and ends at 30° before bottom dead centre
b) starts at top dead centre and ends at 30° after top dead centre
c) may start and end anywhere
d) starts at 15° before top dead centre and ends at 30° after top dead centre
Answer: a
Explanation: The expansion of fuel in a four stroke cycle diesel engine starts at 15° after top dead centre and ends at 30° before bottom dead centre.
3) The brake power of a diesel engine, keeping other parameters constant, can be increased by
a) increasing the pressure of intake air
b) decreasing the density of intake air
c) decreasing the pressure of intake air
d) increasing the temperature of intake air
Answer: a
Explanation: The brake power of a diesel engine, keeping other parameters constant, can be increased by increasing the pressure of intake air.
4) In a four stroke cycle, the minimum temperature inside the engine cylinder occurs at the
a) end of suction stroke
b) Beginning of exhaust stroke
c) Beginning of suction stroke
d) End of exhaust stroke

Answer: c
Explanation: In a four stroke cycle, the minimum temperature inside the engine cylinder occurs at the beginning of exhaust stroke.
5) The effective inhibitor of pre-ignition is
a) alcohol
b) lead
c) water
d) none of the mentioned
Answer: c
Explanation: Water is the most effective inhibitor of pre-ignition.
6) If the temperature of intake air in internal combustion engine increases, then its efficiency will a) remain same
b) increase
c) decrease
d) none of the mentioned
Answer: c
Explanation: The efficiency of an IC Engine is inversely proportional to the temperature of intake air.
7) The operation of forcing additional air under pressure in the engine cylinder is known as
a) Supercharging
b) Scavenging
c) Turbulence

d) Pre-ignition
Answer: a
Explanation: Supercharging is the operation of forcing additional air under pressure in the engine cylinder.
8) The mean effective pressure obtained from engine indicator indicates the
a) maximum pressure developed
b) minimum pressure developed
c) Instantaneous pressure at any point
d) Average pressure
Answer: d

Explanation: The mean effective pressure indicates the average pressure on the engine
9) The probability of knocking in diesel engines is increased by
a) high self-ignition temperature
b) low volatility
c) high viscosity
d) all the mentioned
Answer: d
Explanation: The probability of knocking in diesel engines is increased by keeping high self-ignition temperature, low volatility, high viscosity, etc
10) The maximum temperature in the I.C. engine cylinder is of the order of(in degree Celsius)
a) 500-1000
b) 1000-1500
c) 1500-2000
d) 2000-2500
Answer: d
Explanation: The maximum temperature in the I.C. engine cylinder is of the order of(in degree Celsius) is 2000-25000 degree Celsius
11) In compression ignition engines, swirl denotes a
a) Haphazard motion of the gases in the chamber
b) Rotary motion of the gases in the chamber
c) Radial motion of the gases in the chamber
d) None of the mentioned
Answer: b
Explanation: Swirl in a compression ignition engine denotes rotary motion of the gases in the chamber.
12) Supercharging is the process of
a) Supplying the intake of an engine with air at a density greater than the density of the surrounding atmosphere
b) Supplying compressed air to remove combustion products fully
c) Providing excess temperature to the sucked in gases
d) None of the mentioned

Answer: a
Explanation: Supercharging is the process of supplying the intake of an engine with air at a density greater than the density of the surrounding atmosphere.
13) The object of supercharging the engine is
a) to increase the power output of an engine when greater power is required
b) to reduce mass of the engine per brake power
c) to reduce space occupied by the engine
d) all of the mentioned
Answer: d
Explanation: Supercharging is done to increase the power output of an engine, to reduce mass of the engine per brake power & to reduce space occupied by the engine.

14) The ratio of the volume of charge admitted at N.T.P. to the swept volume of the piston is called
a) overall efficiency
b) mechanical efficiency
c) relative efficiency
d) volumetric efficiency
Answer: d
Explanation: Volumetric Efficiency is the ratio of the volume of charge admitted at N.T.P. to the swept volume of the piston.
15) In a diesel engine, the duration between the time of injection and ignition, is known as
a) delay period
b) period of ignition
c) burning period
d) pre-ignition period
Answer: a
Explanation: In a diesel engine, the duration between the time of injection and ignition, is known as delay period.
16) The reference fuels for knock rating of spark ignition engines would include
a) normal octane and aniline
b) iso-octane and normal hexane
c) iso-octane and alpha-methyl naphthalene

d) normal heptane and iso-octane
Answer: d
Explanation: The reference fuels for knock rating of spark ignition engines would include normal heptane and iso-octane.
17) A diesel engine is as compared to petrol engine, both running at rated load.
a) equally efficient
b) more efficient
c) less efficient
d) all of the mentioned
Answer: b
Explanation: A diesel engine is more efficient as compared to petrol engine, both running at rated load.
18) A higher compression ratio causes
a) increase in detonation
b) pre-ignition
c) an acceleration in the rate of combustion
d) any one of the mentioned
Answer: d
Explanation: A higher compression ratio causes increased detonation, increased rate of combustion & pre-ignition.
19) The injector nozzle of a compression ignition engine is required to inject fuel at a sufficiently high pressure in order to
a) inject fuel at a high velocity to facilitate atomisation
b) inject fuel in a chamber of high pressure at the end of compression stroke
c) ensure that penetration is not high
d) all of the mentioned
Answer: d
Explanation: The fuel injection is at a sufficiently higher pressure in order to inject fuel at a high velocity to facilitate atomisation, to inject fuel in a chamber of high pressure at the end of compression stroke & to ensure that penetration is not high.
19) The scavenging efficiency of a tour stroke cycle diesel engine is
a) between 50-85%

b) between 95-100%
c) below 50%
d) between 85-95%
Answer: b
Explanation: The scavenging efficiency of a tour stroke cycle diesel engine is between 95-100%.
20) If the speed of the engine is increased, the indicated power will
a) increase
b) decrease
c) remain same
d) none of the mentioned
Answer: a
Explanation: The speed of the engine & indicated power are inter related as they are directly proportional to each other, so if one increases, the other also increases & vice-versa
21) If the speed of the engine is increased, the indicated power will
a) increase
b) decrease
c) remain same
d) none of the mentioned
Answer: a
Explanation: The speed of the engine & indicated power are inter related as they are directly proportional to each other, so if one increases, the other also increases & vice-versa
22) Which of the following statement is correct?
a) Compression ratio for petrol engines varies from 6 to 10
b) Petrol engines work on Otto cycle
c) Higher compression ratio in diesel engines results in higher pressures
d) All of the mentioned
Answer: d
Explanation: All the mentioned statements are correct.
23) Higher fuel combustion efficiency cannot be achieved by
a) preheating of fuel gases & combustion air

b) supplying correct amount of combustion air
c) reducing sulphur content in the fuel
d) adopting proper fuel firing technique & fuel preparation
Answer: c
Explanation: Higher fuel combustion efficiency cannot be achieved by reducing the sulphur content in the fuel as sulphur content has nothing much to do with the combustion efficiency.
24) Choice of a gas turbine depends most on which of these factors?
a) Compression ratio
b) Cut-off ratio
c) Pressure ratio
d) none of the mentioned
Answer: c
Explanation: The working a Brayton cycle can be estimated most effectively by pressure ratio, so it becomes the most important factor.
25) For the same capacity engines, the compression ratio of diesel engine
a. is lower than the compression ratio of SI engine
b. is higher than the compression ratio of SI engine
c. is same as the compression ratio of SI engine
d. cannot say
ANSWER b. is higher than the compression ratio of SI engine
26) Rate of burning in the compression ignition engine can be controlled by
a. rate of injection of fuel
b. rate of air taken into carburettor

c. both a. and b.
d. none of the above
ANSWER a. rate of injection of fuel
27) For the same maximum pressure and temperature, what is the relation among the efficiencies of the Otto cycle, the Diesel cycle and the Dual cycle?
a. ηDual >ηDiesel >ηOtto
b. ηDiesel >ηDual >ηOtto
c. ηDiesel >ηOtto >ηDual

d. ηOtto >ηDiesel >ηDual
ANSWER b. ηDiesel >ηDual >ηOtto
28) Air standard cycle uses as a working medium.
a. Perfect gas
b. Real gas
c. Ideal gas
d. Natural gas ANSWER a. Perfect gas 29).For perfect gas
a. cp – cv = R
b. cp + cv = R
c. cp / cv = R
d. cp X cv = R Where cp & cv are specific heats at constant pressure and volume.
ANSWER a. CP – CV = R
30) The self-ignition temperature of diesel as compared to petrol is
a. higher
b. lower
c. same d.varies
ANSWER a. higher
31) For same compression ratio and heat input
a. Otto cycle is more efficient
b. Diesel cycle is more efficient
c. Both are equally efficient
d. None of the above
ANSWER a. Otto cycle is more efficient
32) For the same peak pressure and heat input
a. Otto cycle is more efficient
b. Diesel cycle is more efficient
c. Both are equally efficient

d. None of the above
ANSWER b. Diesel cycle is more efficient
33) In diesel engine, the fuel is ignited by
a. spark
b. injected fuel
c. heat resulting from compressing air that is supplied for combustion
d. igniter
ANSWER c. heat resulting from compressing air that is supplied for combustion
34) Scavenging air in diesel engine means
a. air used for combustion under pressure
b. forced air for cooling the cylinder
c. burnt air containing products of combustion
d. air used for forcing burnt gases out of the engines cylinder during the exhaust stroke
ANSWER d. air used for forcing burnt gases out of the engines cylinder during the exhaust stroke
35) Supercharging is the process of
a. supplying the engine with air at a density greater than the density of the surrounding atmosphere

b. providing forced cooling air
c. injecting excess fuel
d. raising the exhaust pressure
ANSWER a. supplying the engine with air at a density greater than the density of the surrounding atmosphere
36) If the compression ratio of an engine working on Otto cycle is increased from 5 to 7 the percentage increase in efficiency will be
a. 2%
b. 4%
c. 8%
d. 14%
ANSWER d
37) A diesel engine is usually more efficient than a spark ignition engine because
a. Diesel being a heavier hydrocarbon, release more heat per kg than gasoline

b. The air standard efficiency of diesel cycle is higher than the Otto cycle, at a fixed compression ratio
c. The compression ratio of a diesel engine is higher than that of an Spark ignition engine
d. Self-ignition temperature of diesel is higher than that of gasoline.
ANSWER c. The compression ratio of a diesel engine is higher than that of an S.I engine
38) The output of a diesel engine can be increased without increasing the engine size in following way a. injecting more fuel
b. increasing flywheel size
c. scavenging
d. supercharging
ANSWER d. supercharging
39) The air fuel ratio in petrol engines is controlled by
a. valve opening / closing
b. governing
c. carburetion
d. scavenging
ANSWER c. carburetion
40) Which of the following is not an internal combustion engine?
a. petrol engine
b. steam turbine
c. diesel engine
d. gas turbine
ANSWER b. steam turbine
41) Most high-speed compression engines operate on
a. diesel cycle
b. Otto cycle
c. dual cycle
d. Carnot cycle
ANSWER c. dual cycle
42) Which of the following medium is compressed in a diesel engine cylinder?
a. air

b. air and fuel
c. air and lubricating oil
d. fuel
ANSWER a. air
43) A supercharger is used to compress
a. air
b. gasoline
c. fuel oil

d. all of the above
ANSWER a. air
44) The term scavenging is generally associated with
a. 2-stroke engine
b. 4-stroke engine
c. high efficiency engine
d. diesel engine
ANSWER C. high efficiency engine
45) If the intake air temperature of Internal combustion engine increases, its efficiency will
a.increase
b.decrease
c. remains same d unpredictable
ANSWER b. decrease
46) Gas turbines with intercooling, regeneration & reheat are more suitable for combined cycles.
a) True
b) False
Answer: b
Explanation: Increasing the stages in a gas turbine with combined cycles will decrease its efficiency.
47) What is the optimum pressure ratio range for a gas turbine to obtain optimum efficiency?
a) 7-8.5

b) 10.5-12
c) 9.5-10
d) 10-20
Answer: b
Explanation: The optimum pressure ratio range for a gas turbine to obtain optimum efficiency is 10.5-12.
48) What is that temperature called to which the exhaust gases of a gas turbine are cooled to?
a) Oxygen Dew point
b) Carbon dioxide Dew point
c) Nitrogen Dew point
d) Sulphuric Acid Dew point
Answer: d
Explanation: As the maximum temperature of cooling that can be reached has to be the dew point of one of these gases, so the dew point of Sulphuric Acid [Sulphur dioxide discharge] is chosen.
49) With an increase in the combined cycle pressure ratio, the efficiency of the bottoming cycle?
a) increases
b) decreases
c) remains same
d) none of the mentioned
Answer: b
Explanation: The efficiency of the bottoming cycle is inversely proportional to combined cycle pressure ratio, so this relation.
50) The installation time for a gas turbine power plant is
a) Comparatively less than thermal power plant
b) Comparatively more than thermal power plant
c) Equal to thermal power plant
d) Very much longer than thermal power plant
Answer: a
Explanation: Gas turbine power plant is comparatively simpler in construction than thermal power plant. So, its installation time is less than a thermal power plant for same capacity.

51) Which of the following is not used in gas turbine power plant?
a) Compressor
b) Turbine
c) Combustion chamber
d) Condenser
Answer: d
Explanation: Natural gas itself or mixture of natural gas and air is used as working medium in gas turbine power plant. Condenser is a device or arrangement used to condense low pressure steam already used by turbine. There is no steam in gas turbine power plant so no condenser is required
52) Which component of gas turbine power plant is main cause of its low efficiency?
a) Gas turbine
b) Combustion chamber
c) Compressor
d) Starting motor
Answer: c
Explanation: The overall efficiency of gas turbine is low, because a greater part of power developed by the turbine (about 65%) is used in driving the compressor.
53) What is intercooling in gas turbine power plant?
a) Removal of heat from combustion gas between stages of turbine
b) Removal of heat from compressor between stages of compressor
c) Removal of heat from intake air
d) Removal of heat from exhaust air
Answer: b
Explanation: Intercooling means removal of heat from compressed air between low pressure and high pressure compressor. Cooling the low pressure compressed air reduces the air volume and improves the thermal efficiency, air rate and work ratio.
54) What is the function of regenerator?
a) Eatery compresses the exhaust gases
b) It heats the compressed air
c) It regenerates the combustible gas from exhaust gas
d) It regenerates the combustible oil from exhaust gas

Answer: b
Explanation: Regenerator is usually of shell and tube construction. Regenerator uses the heat of exhaust gas to heat compressed air before it is sent to combustion chamber. This reduces the fuel consumption and improves the cycle thermal efficiency.
55) Fuel other than natural gas i.e. solid and liquid fuels can be used in
a) open cycle gas turbine power plant
b) closed cycle gas turbine power plant
c) open and closed cycle gas turbine power plant
d) only natural gas is used in gas turbine power plant
Answer: b
Explanation: In closed cycle gas turbine power plant the working medium is heated externally and the fuel is not mixed with working fluid. This ensures the use of any fuel such as inferior type or solid type fuel.
56) Which of the following gas turbine power plant can use working medium of required property?
a) Closed cycle gas turbine power plant
b) Open cycle gas turbine power plant
c) Open and closed cycle gas turbine power plant
d) No gas turbine power plant can use working medium of required property.
Answer: a
Explanation: A working medium with physical properties superior to those of air such as helium

and hydrogen can be used in closed cycle gas turbine power plant. This is because of airtight construction of this plant

57) What is the air standard cycle for a Gas-Turbine called?
a) Reheat cycle
b) Rankine cycle
c) Brayton cycle
d) Diesel cycle
Answer: c
Explanation: Brayton cycle is an ideal air standard cycle for a Gas turbine, which, like Rankine cycle, also comprises of two reversible adiabatic & two reversible isobars

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59) Which of the following is a type of Gas Turbine Plant?
a) Single Acting
b) Double Acting
c) Open
d) None of the mentioned
Answer: c
Explanation: Open & Closed Gas Turbine plants are the two types.

60) A Gas Turbine is which type of combustion plant?
a) external
b) open
c) internal
d) cannot say
Answer: c
Explanation: Since for the production of power, the working fluid does some work on the blades of the turbine, thereby producing Power. Hence, it is called an internal combustion plant.

61) Which among these is the main component of a gas turbine plant?
a) Condenser
b) Compressor
c) Boiler
d) Both (b) & (c)
Answer: b
Explanation: The main component of a Gas turbine plant is Compressor.

62) Which type of compressor is used in a gas turbine plant?
a) Reciprocating compressor
b) Screw compressor
c) Multistage axial flow compressor
d) Either (a) & (b)
Answer: c
Explanation: Multistage axial flow compressor is the compressor in practical usage in a gas turbine plant.

63) What part or % of power developed is utilised for driving the compressor? a) 65 %
b) 70 %
c) 55 %
d) 80 %
Answer: a

Explanation: A total of 65 % of power developed in the gas turbine is used for driving the compressor.

64) The gas turbine power plant mainly uses which among the following fuels?
a) Coal and Peat
b) Kerosene oil and diesel oil and residual oil
c) Gas oil
d) Natural gas and liquid petroleum fuel
Answer: d
Explanation: Natural gas and liquid petroleum fuel are among the two fuels used in a gas turbine.

65) The heating value of gaseous fuels is about
a) 500 kJ/litre
b) 30 kJ/litre
c) 100 kJ/litre
d) 10 kJ/litre
Answer: b
Explanation: 30 kJ/litre is the heating value of gaseous fuels.

66) The compressor has to be started
a) Before starting the gas turbine

b) After starting the gas turbine
c) Simultaneously with starting of gas turbine
d) At any time during the operation
Answer: a
Explanation: Compressor has to be started before starting the gas turbine as the turbine work is used by compressor.

67) Which of these is not a part of a Gas Turbine Plant?
a) Compressor
b) Gas Turbine
c) Combustion chamber
d) Boiler
Answer: d
Explanation: A Gas Turbine Plant has the following parts: Compressor, Gas Turbine, Combustion chamber

68) The major field(s) of application of gas turbine is (are)
a) Aviation
b) Oil and gas industry
c) Marine propulsion
d) All of the mentioned
Answer: d
Explanation: A Gas Turbine has applications in nearly all fields, the major ones being in the fields of Aviation, Oil & Gas industry, Marine propulsion.

69) The following is (are) the limitation(s) of gas turbines.
a) They are not self-starting
b) Higher rotor speeds
c) Low efficiencies at part loads
d) All of the mentioned
Answer: d
Explanation: The limitations in the functioning of a Gas Turbines are inability of self-starting, excess rotor speeds and inability to adjust to varying loads.

70) The following method(s) can be used to improve the thermal efficiency of open cycle gas turbine plant

a) Inter-cooling
b) Reheating

c) Regeneration
d) All of the mentioned
Answer: d
Explanation: The various methods to improve the efficiency of open cycles include intercooling the feed water from the compressor to the turbine and then employing regeneration & reheat to just use the power of the reheated water in order to maximize the power output
71) A gas turbine expands 4 kg/s of air from 12 bar and 900°© to 1 bar adiabatically with an isentropic efficiency of 87%. Calculate the exhaust temperature and the power output. Adiabatic index 1.4, cp = 1005 J/kg K a) 641.85 K & 1 MW
b) 641.85 K & 2.135 MW
c) 660.85 K & 2.8 MW
d) None
Answer: b
Explanation: T2 = T1 (1/12)1-1/1.4 = 1173 (1/12)0.2958 = 562.48 K
Ideal temperature change = 1173 - 562.48 = 610.52 K Actual temperature change = 87% x 610.52 = 531.15 K Exhaust temperature = 1173 - 531.15 = 641.85 K
The steady flow energy equation states
Since it is an adiabatic process dQ = 0 so Pout = m x cp x dT = 4 x 1005 x (531.15) Pout =2.135 x 106 W
Pout = 2.135 MW
72) A gas turbine uses the Joule cycle. The pressure ratio is 6/1. The inlet temperature to the compressor is 10oC. The flow rate of air is 0.2 kg/s. The temperature at inlet to the turbine is 950°©. Calculate the cycle efficiency. Adiabatic index = 1.4, cp = 1.005 kJ/kg K
a) 40%
b) 80%
c) 66%
d) None
Answer: a

Explanation:
The cycle efficiency = 1 - (P2/P1)-0.285 = 1 - (6)-0.285 = 0.4 x 100 = 40%
73) The Rateau turbine belongs to the category of
(a) Pressure compounded turbine
(b) Reaction turbine
(c) Velocity compounded turbine
(d) Radial flow turbine
Answer: a
74) For air standard Brayton cycle, increase in the maximum temperature of the cycle, while keeping the pressure ratio the same would result in
(a) Increase in air standard efficiency
(b) Decrease in air standard efficiency
(c) No change in air standard efficiency
(d) Increase in the efficiency but reduction in net work
Answer: a
75) In a simple gas turbine power plant operating on standard Brayton cycle power needed to drive the compressor is 175 kW, rate of heat supplied during constant pressure heat addition process is 675 kW. Turbine output obtained during expansion is 425 kW. What is the rate of heat rejection during constant pressure heat rejection?
(a) 75 kW
(b) 425 kW
(c) 500 kW
(d) 925 kW
Answer: b
76) Consider the following statements:
1. Inter-cooling is effective only at lower pressure ratios and high turbine inlet

temperatures.
2. There is very little gain in thermal efficiency when inter-cooling is used without the benefit of regeneration
3. With high values of 'γ' and cp of the working fluid, the net power output of Brayton cycle will increase.
(a) 1, 2 and 3 are correct
(b) 1 and 2 are correct
(c) 1 and 3 are correct

(d) 2 and 3.are correct.
Answer: d
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(b) 1 and 2 are correct
(c) 1 and 3 are correct
(d) 2 and 3.are correct.
Answer: d
78) Consider the following statements:
When air is to be compressed to reasonably high pressure, it is usually carried out by a multistage compressor with an intercooler between the stages because
1. Work supplied is saved.
2. Weight of compressor is reduced.
3. More uniform torque is obtained leading to the reduction in the size of flywheel.
4. Volumetric efficiency is increased. Of the four statements listed above correct is/are?
(a) 1 alone
(b) 2 and 4
(c) 1, 2 and 3
(d) 1 2, 3 and 4
Answer: d
79) Inter-cooling in gas turbines
(a) Decreases net output but increases thermal efficiency
(b) Increases net output but decreases thermal efficiency
(c) Decreases both net output and thermal efficiency
(d) Increases both net output and thermal efficiency
Answer: b

80) The use of regenerator in a gas turbine cycle
(a) Increases efficiency but has no effect on output
(b) Increases output but has no effect on efficiency
(c) Increases both efficiency and output
(d) Increases efficiency but decreases output IES-34.
Answer: b