

# Zeal Education Society's **ZEAL POLYTECHNIC, PUNE**

NARHE | PUNE -41 | INDIA

DEPARTMENT OF MECHANICAL ENGINEERING

### THIRD YEAR (TY)

SCHEME: I

**SEMESTER: V** 

NAME OF SUBJECT: POWER PLANT ENGINEERING Subject Code: 22566

# UNIT WISE MULTIPLE CHOICE QUESTIONS BANK



# ZEAL EDUCATION SOCIETY'S ZEAL POLYTECHNIC,PUNE

NARHE | PUNE -41 | INDIA

DEPARTMENT OF MECHANICAL ENGINEERING



#### **Question Bank for Multiple Choice Questions**

Program: Diploma in Mechanical Engineering	Program Code:- ME
Scheme: I	Semester: Fifth
Course: Power Plant Engineering	Course Code: 22566

Marks:12

**01- Introduction to Power Plant** 

#### Content of Chapter:

1.1 World and national scenario of demand and supply of energy

1.2 Introduction to power plants: their importance and types.

1.3 Hydroelectric power plant: Classification, General arrangement, operating principle, advantages and limitations, Maintenance.

1.4 Diesel power plant: Introduction, components, advantages and limitations, Diesel generating set, Maintenance.

#### 1. Demand factor is defined as

- (A) Average load/maximum load
- (B) Maximum demand/connected load
- (C) Connected load/maximum demand
- (D) Average load
- Answer: Option B
  - 2. Which of the following place is not associated with nuclear power plants in India?
  - (A) Narora
  - (B) Tarapur
  - (C) Kota
  - (D) Benglore

Answer: Option D

3. Power plant is expected to have the longest life.

- (A) Steam
- (B) Diesel
- (C) Hydroelectric
- (D) Any of the above

#### Answer: Option C

- 4. In fuel transportation cost is least.
- (A) Nuclear power plants
- (B) Diesel generating plants
- (C) Steam power stations
- (D) Solar power plant

#### Answer: Option A

- 5. The commercial sources of energy are
- (A) Solar, wind and biomass
- (B) Fossil fuels, hydropower and nuclear energy
- (C) Wood, animal wastes and agriculture wastes
- (D) None of the above

#### Answer: Option B

- 6. In India largest thermal power station is located at
- (A) Kota
- (B) Sarni
- (C) Chandrapur
- (D) Neyveli

#### Answer: Option C

- 7. The main source of production of biogas is
- (A) Human waste
- (B) Wet cow dung
- (C) Wet livestock waste
- (D) All above

#### Answer: Option D

8. In fuel cell, the energy is converted into electrical energy.

- (A) Mechanical
- (B) Chemical
- (C) Heat
- (D) Sound

#### Answer: Option B

- 9. The objective function to the optimization problem in a hydro-thermal system becomes
- (i) Minimize the fuel cost of thermal plants
- (ii) Minimize the time of operation
- (iii) Minimize the water availability of hydro-generation
- (A) Only (i)
- (B) Only (ii)
- (C) Only (iii)
- (D) Only (i), (ii), (iii)
- Answer: Option D
  - 10. In a hydro-power station, a surge tank is provided to
  - (A) Increase the supply of water
  - (B) Control the water flow in the turbine
  - (C) Reduce the diameter of the penstock
  - (D) Control pressure variation in pipes due to sudden load variations

#### Answer: Option D

- 11. Which of the following is not a requirement for site selection of hydroelectric power plant?
- (A) Availability of water
- (B) Large catchment area
- (C) Rocky land
- (D) Sedimentation

#### Answer: Option D

- **Explanation:** Sedimentation may reduce the water storage capacity of reservoir and may also cause damage to the turbine blades. Availability of water, large catchment area and rocky land are primary requirements for site selection of hydroelectric power plant.
  - 12. The amount of electrical energy that can be generated by a hydroelectric power plant depends upon

- (A) Head of water
- (B) Quantity of water
- (C) Specific weight of water
- (D) Efficiency of Alternator
- Answer: Option B
- **Explanation:** Potential energy of large quantity of stored water is used by hydroelectric power plant to generate electrical energy. Head of water is important to get kinetic energy from that potential energy. Efficiency of alternator represents that what percentage of input mechanical power it can convert into electrical power.
  - 13. Potential energy of water is used to drive the turbine.
  - (A) True
  - (B) False
  - Answer: Option B
- **Explanation:** When water falls, potential energy of water is converted into kinetic energy. This kinetic energy is used to drive the turbine.
  - 14. Hydroelectric power plant is
  - (A) Non-renewable source of energy
  - (B) Conventional source of energy
  - (C) Non-conventional source of energy
  - (D) Continuous source of energy
  - Answer: Option B
- **Explanation:** Hydroelectric power plants are conventional source of energy. About 16.6% of total electricity and about 70% of total renewable energy of world is provided by hydroelectric power plants. They are not Non-renewable because water is inexhaustible. It is not continuous source of energy because its output fluctuates with change in flow rate of water with season.
  - 15. Hydroelectric power plant is generally located near load centre.
  - (A) True
  - (B) False
- Answer: Option B
- **Explanation:** Hydroelectric power plants are generally constructed in hilly areas. These power plants are quite away from the load centre.
  - 16. Hydroelectric power plant is mainly located in

- (A) Flat areas
- (B) Deserts
- (C) Hilly areas
- (D) Deltas

#### Answer: Option C

Explanation:

tion: In order to get sufficient head, hydroelectric power plants are constructed in hilly areas. In desert and flat areas sufficient water head cannot be obtained. Deltas are not suitable for this because of high sedimentation.

#### 17. Which statement about hydroelectric power plant is wrong?

- (A) Efficiency of hydroelectric power plant does not reduce with age
- (B) Its construction coast is very high and takes a long time for erection.
- (C) It is very neat and clean plant because no smoke or ash is produced.
- (D) Meeting rapidly changing load demands is not possible in hydroelectric power plant.
- Answer: Option D
- **Explanation:** Fluctuating load demands can be met just by controlling the flow of water using valves and gates. Due to its robust construction, its efficiency does not fall with time.
  - 18. Which of the following is not an advantage of hydroelectric power plant?
  - (A) No fuel requirement
  - (B) Low running cost
  - (C) Continuous power source
  - (D) No standby losses

#### Answer: Option C

- **Explanation:** Output of such plants is never constant. This is because of their dependency over flow rate of water in river which is seasonal. No fuel requirement low running cost and no standby losses are advantages of hydroelectric power plants.
  - 19. Which of the following statement is true about hydroelectric power plant?
  - (A) Hydroelectric power plants are multipurpose.
  - (B) Due to non-uniform flow of water frequency control in such plants is very difficult.
  - (C) Hydroelectric power plant has high running cost
  - (D) Water is used as fuel in hydroelectric power plant
  - Answer: Option A

- **Explanation:** It is because in addition to generation of electricity they are also used for irrigation, flood control etc. Frequency control in such plants is done easily just by controlling flow of water to the turbine through valves and gates. Due to low maintenance cost and no fuel requirement running cost of a plant is very low. Water is not fuel.
  - 20. Which element of hydroelectric power plant prevents the penstock from water hammer phenomenon?
  - (A) Valves and Gates
  - (B) Draft tubes
  - (C) Spillway
  - (D) Surge tank
  - Answer: Option D
- **Explanation:** Sudden increase in water pressure in penstock due to closing of gates is called water hammer. Surge tank is a tank at sufficient height, connected to penstock through riser pipe. It takes the rejected water and relives the penstock from excessive water hammer pressure.
  - 21. Dam having very wide base as compared to its height is called
  - (A) Buttress dam
  - (B) Arch dam
  - (C) Earth dam
  - (D) Solid gravity dam
  - Answer: Option C
- **Explanation:** Buttress dams are the concrete dams supported on downstream side by buttresses. Arc dams are concrete dams curved from upstream side. Earth dam is a type of embankment dam and have rock filled inside the structure.
  - 22. Spillway discharges the overflow water to the downstream side when the reservoir is full.
  - (A) True
  - (B) False
  - Answer: Option A

**Explanation:** A condition may arise during flood periods when water level increases beyond the capacity of reservoir. In such conditions spillway acts as safety valve

- 23. Penstock in a hydroelectric power plant is
- (A) A pipe connected to runner outlet
- (B) Nozzle that release high pressure water on turbine blades
- (C) A conduit connecting forebay to scroll case of turbine

- (D) A pipe connecting surge tank to dam
- Answer: Option C

**Explanation:** Penstocks are the conduit built of steel or reinforced concrete. Penstock connects forebay or surge tank to scroll case of turbine. Their main function is to carry water from dam to the turbine.

- 24. Which of the following is not part of diesel engine power plant
- (A) Fuel tank
- (B) Cooling tower
- (C) Penstock
- (D) Exhaust system

#### Answer: Option C

**Explanation:** A penstock is not a part of diesel engine power plant. While other three mentioned parts belong to the Diesel Engineering Power Plant.

#### 25. Which of the following are pros of diesel power station

- (A) Lubrication
- (B) Power quantity
- (C) Cost
- (D) Emergency utilization

#### Answer: Option D

- 26. In case when energy is required in bulk, a is more favorable than
- (A) Diesel plant, Nuclear plant
- (B) Nuclear plant, Diesel plant
- (C) Both are equally favorable
- (D) Any of the above

#### Answer: Option B

- 27. Operating cost of \_\_\_\_\_ is lower than \_\_\_\_\_
- (A) Diesel, hydro
- (B) Hydro, diesel
- (C) Both cost equal
- (D) Any of above

Answer:	Option A
Explanation:	Because cost invoved in case of maintenance of Hydro Power Plant is more
28.	The diesel engine power plant are mainly used as:
(A)	Base load power plant
(B)	Peak load power plant
(C)	Stand-by power plant
(D)	Above (B) & (C)
Answer:	Option D
Explanation:	The diesel engine power plants are mainly employed as peak load as well as stand-by power
29.	Where reactor operation is designed with fast neutrons such as in reactors using highly enriched fuel, the moderator used is?
(A)	Carbon dioxide
(B)	Heavy water
(C)	Graphite
(D)	No moderator is needed
Answer:	Option D
Explanation:	Where reactor operation is designed with fast neutrons such as in reactors using highly enriched fuel, no moderator is required
30.	The thermal efficiency of diesel engines is about in percentage
(A)	30 DOTD-190
(B)	15
(C)	50
(D)	70 7PAL DOLVTECUNIC
Answer:	Option D
Explanation:	The thermal efficiency of diesel engines is about 70%
31.	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: Option A

- **Explanation:** The brake power of a diesel engine, keeping other parameters constant, can be increased by increasing the pressure of intake air.
  - 32. What is 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: Option D
- **Explanation:** The maximum temperature in the I.C. engine cylinder is of the order of (in degree Celsius) is 2000-25000 degree Celsius.
  - 33. 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: Option 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.

- 34. 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: Option A

- 35. What is the pour point of fuel oil?
- (A) Minimum temperature to which oil is heated in order to give off inflammable vapours in sufficient quantity to ignite momentarily when brought in contact with a flame
- (B) Temperature at which it solidifies or congeals
- (C) It catches fire without external aid
- (D) Indicated by distillation temperature i.e., when of sample oil has distilled off

Answer: Option B

Explanation: The temperature at which fuel oil solidifies or congeals is called pour point of fuel oil. 36. The mean effective pressure obtained from engine indicator indicates the Maximum pressure developed (A) (B) Minimum pressure developed (C) Instantaneous pressure at any point (D) Average pressure Answer: Option D Explanation: The mean effective pressure indicates the average pressure on the engine. If the temperature of intake air in internal combustion engine increases, then its efficiency 37. will (A) Remain same (B) Increase (C) Decrease (D) None of the mentioned Answer: Option C The efficiency of an IC Engine is inversely proportional to the temperature of intake air. Explanation: The ignition quality of petrol is expressed by 38. (A) Cetane number (B) Octane number (C) Calorific value (D) None of the mentioned Answer: Option B **Explanation:** Octane number estimates the quality of petrol. 39. The probability of knocking in diesel engines is increased by (A) High self-ignition temperature (B) Low volatility (C) High viscosity (D) All of the mentioned Answer: Option D Explanation: The probability of knocking in diesel engines is increased by keeping high self-ignition temperature, low volatility, high viscosity, etc.

#### 40. The power output from a hydro-electric power plant depends on three parameters......

- (A) Head, type and dam of discharge
- (B) Head, discharge and efficiency of the system
- (C) Efficiency of the system, type of draft tube and type of turbine used
- (D) Type of dam, discharge and type of catchment area
- Answer: Option B

**Explanation:** Because output is related with head, discharge and efficiency

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DEPARTMENT OF MECHANICAL ENGINEERING



#### **Question Bank for Multiple Choice Questions**

Program: Diploma in Mechanical Engineering	Program Code:- ME
Scheme: I	Semester: Fifth
Course: Power Plant Engineering	Course Code: 22566

02- High Pressure Boilers

Marks:-12

#### **Content of Chapter:**

2.1 High Pressure Boilers - Classification.

2.2 Construction and principle of working of Lamont boiler, Benson boiler, Loeffler boiler, Velox boiler, Schmidt Hartman boiler, Ramsin boiler

2.3 Fluidized bed combustion boilers (FBC): principle, need, types, various arrangement, control system and advantages over other boiler systems.

2.4 Comparison of various types of boilers

2.5 Indian Boiler Regulation Act

2.6 Maintenance procedure of major components of high pressure and FBC boilers

#### 1. Super critical boilers are

- (A) Fire tube boilers
- (B) Water tube boilers
- (C) A combination of both fire and water tube boilers
- (D) Once through boilers

#### Answer: Option (D)

- **Explanation:** A large number of steam generating units are designed between working ranges of 125 atm and to 300 atm and These are basically characterized as subcritical and supercritical. Subcritical consists, preheater, evaporator and superheater while supercritical boiler requires only preheater and superheater. Supercritical boilers operate at a pressure greater than 22 MPa and also referred to as Once through boilers since the feed water circulates only once through boiler in each steam cycle.
  - 2. For the same diameter and thickness of tube, a water tube boiler compared to a fire tube boiler has:

- (A) More heating surface
- (B) Less heating surface
- (C) Equal heating surface
- (D) Heating surface depends on other parameters

#### Answer: Option (D)

- **Explanation:** In water tube boilers, water is contained in many small diameter tubes; therefore, the heating surface of a water tube boiler is more than that of the fire tube boiler. The relatively large heating surface of the water tube boiler increases the evaporation rate. The increased rate of evaporation of the water tube boiler makes it more suitable for large power plants.
  - 3. Which of the following is not true with regard to an economizer in a steam boiler?
  - (A) It preheats feed-water
  - (B) It is used for recovery of heat from flue gases
  - (C) It gives increased boiler efficiency
  - (D) It produces superheated steam
  - Answer: Option (D)
- **Explanation:** Economizer: It is also known as a feed water heater. It is a device in which the waste heat of the flue gases is utilized for heating the feed water. In economizer, feed water is preheated by using flue gases to improve overall efficiency and only sensible heat transfer is taking place so feed water is heated without converting it into steam. Therefore, the economizer: 1.Reduce after the super heater and located in the feeding water circuit. Functions of economizer: 1.Reduce fuel consumption 2. Preheating a fluid (feed-water in case of steam boiler), 3. Increases the efficiency of the power plant
  - 4. Which one of the following boiler accessories does not need 'flue-gas' for its operation?
  - (A) Economizer
  - (B) Preheater
  - (C) Injector
  - (D) Super heater
  - **Answer:** Option (C)
    - 5. Which of the following is a boiler accessory?
    - (A) Safety valve
    - (B) Economizer
    - (C) Pressure gauge
    - (D) Fusible plug

**Answer:** Option (B)

**Explanation:** These are those devices which are installed with a boiler and its neighboring area to increase the efficiency of the boiler. These are not the essential part of the boiler and thus without installing these devices, the boiler operation can be accomplished through at a lower efficiency

#### 6. In a locomotive boiler, the draught is produced by:

- (A) chimney
- (B) an induced draught fan
- (C) steam jet
- (D) centrifugal fan

#### Answer: Option (B)

- **Explanation:** In a locomotive boiler, the draught is produced by a steam jet. The draught is one of the most essential systems of the thermal power plant which supplies the required quantity of air for combustion and removes the burnt products from the system.
  - 7. Which one is the low-pressure steam generator?
  - (A) Benson steam generator
  - (B) Loeffler steam generator
  - (C) Volex steam generator
  - (D) none of these

Answer: Option (D)

- 8. Name the boiler which can generate superheated steam without additional accessories
- (A) Cornish boiler
- (B) Locomotive boiler
- (C) Lancashire boiler
- (D) Cochran boiler

#### **Answer:** Option (C)

9. Which of the following fittings is used to extinguish the boiler furnace fire in case the water level falls below the safe level?

- (A) Feed check valve
- (B) Safety valve
- (C) Fusible plug
- (D) Blow-off cock

**Answer:** Option (C)

- 10. The steam capacity of Cochran boiler is
- (A) 2000 Kg/hrs
- (B) 3000 Kg/hrs
- (C) 4000Kg/hrs
- (D) 5000 Kg/hrs
- Answer: Option (C)
  - 11. Equivalence evaporation is defined as
  - (A) the ratio of heat actually used in producing stream to the heat liberated in the furnace
  - (B) the amount of water evaporated in per of coal burnt
  - (C) evaporation of water from and at 100°C into dry saturated steam
  - (D) evaporation of 15.653 Kg of water per hour from and at 100°C

**Answer:** Option (C)

- 12. A super critical boiler requires
- (A) Only preheater and superheater
- (B) Preheater, evaporator and superheater
- (C) Only preheater
- (D) Only superheater
- **Answer:** Option (A)
- Explanation: Super critical boilers requires only preheater and superheater
  - 13. Which of the following is a type of high-pressure boiler?
  - (A) Lancashire boiler
  - (B) Velox boiler
  - (C) Locomotive boiler
  - (D) Cornish boiler
  - Answer: Option (B)
- **Explanation:** The pressure range of Velox boiler is over 140 bar
  - 14. Conventionally, in a Babcock & Wilcox boiler, the circulation of water between the drum and the water-tubes is
  - (A) Caused by gravity

- (B) By a pump
- (C) There is no circulation of water
- (D) Normally by naturally circulation (thermosiphon)
- Answer: Option (D)

Explanation: Babcock & Wilcox boiler is Natural Convection Boiler

- 15. Which one of the following is a horizontal boiler?
- (A) Cochran boiler
- (B) Lancashire boiler
- (C) Both 1 and 2
- (D) None of these
- Answer: Option (B)
- **Explanation:** Its construction is horizontal
  - 16. Which one of the following is a vertical boiler?
  - (A) Cochran boiler
  - (B) Locomotive boiler
  - (C) Lancashire boiler
  - (D) Babcock and Wilcox boiler
  - Answer: Option (A)
- Explanation: Cochran boiler construction is verical
  - 17. How many flue tubes are there in Cornish boiler?
  - (A) 1
  - (B) 2
  - (C) 3
  - (D) 4

Answer: Option (A)

18. How many flue tubes are there in Lancashire boiler?

- (A) 1
- (B) 2
- (C) 3
- (D) 4

- **Answer:** Option (B)
  - 19. Which one of the following statements is not true?
  - (A) Capacity of Cornish boiler is lower than that of Lancashire boiler
  - (B) Capacity of Cornish boiler is higher than that of Lancashire boiler.
- **Answer:** Option (A)
- **Explanation:** Capacity of Cornish boiler is higher than that of Lancashire boiler.

#### 20. Water tube boiler generates steam at pressure

- (A) Upto 65 bar
- (B) Upto 165 bar
- (C) Upto 25 bar
- (D) Upto 80 bar
- Answer: Option (B)
  - 21. Fire tube boiler generates steam at pressure
  - (A) Upto 65 bar
  - (B) Upto 165 bar
  - (C) Upto 25 bar
  - (D) Upto 80 bar
- **Answer:** Option (C)
  - 22. Overall efficiency with economizer of a water tube boiler is
  - (A) 90%
  - (B) 75%
  - (C) 65%
  - (D) 55%
- **Answer:** Option (A)
  - 23. Overall efficiency of a fire tube boiler is
  - (A) 90%
  - (B) 75%
  - (C) 65%
  - (D) 55%

**Answer:** Option (B)

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(A)	9 tonnes per hour
(B)	90 tonnes per hour
(C)	250 tonnes per hour
(D)	450 tonnes per hour
Answer:	Option (D)
25.	Which one of the following is an example of mounting?
(A)	Water level indicator
(B)	Superheater
(C)	Economizer
(D)	None of these
Answer:	Option (A)
Explanation:	Because water level indicator is essential component in boiler
26.	Which one of the following is an example of accessories?
(A)	Water level indicator
(B)	Safety valve
(C)	Pressure gauge
(D)	Superheater
Answer:	Option (D)
Explanation:	Superheater not essential but it is used to increase the efficiency of boiler
27.	The function of the blow off cock valve is
(A)	To control the flow of steam
(B)	To regulate the supply of water
(C)	To put off the fire when the level of water falls to an unsafe level
(D)	To empty the boiler whenever required
Answer:	Option (D)
28.	The function of the steam stop valve is
(A)	To control the flow of steam
(B)	To regulate the supply of water
(C)	To put off the fire when the level of water falls to an unsafe level

24. The rate of generation of steam in a water tube boiler is

(D) To empty the boiler whenever required

**Answer:** Option (A)

#### 29. The function of the feed check valve is

- (A) To control the flow of steam
- (B) To regulate the supply of water
- (C) To put off the fire when the level of water falls to an unsafe level
- (D) To empty the boiler whenever required

#### **Answer:** Option (B)

- 30. The function of the fusible plug is
- (A) To control the flow of steam
- (B) To regulate the supply of water
- (C) To put off the fire when the level of water falls to an unsafe level
- (D) To empty the boiler whenever required

Answer: Option (C)

#### 31. Due to use Air Pre-heater, the changes in efficiency is

- (A) 2% increase
- (B) 2% decrease
- (C) 20% increase
- (D) 20% decrease

#### Answer: Option (A)

- Explanation: Because hot air is utilized in combustion purpose it leads to increase of efficiency by small amount
  - 32. The heat losses in a boiler are
  - (A) Heat lost in dry flue gases
  - (B) Heat lost in moisture present in the fuel
  - (C) Heat lost due to unburnt carbon
  - (D) All of these
  - Answer: Option (D)
    - 33. Equivalent evaporation is defined as
    - (A) The ratio of heat actually used in producing the steam to the heat liberated in the furnace
    - (B) The amount of water evaporated or steam produced in kg per kg of fuel burnt

- (C) The amount of water evaporated from and at 100°C into dry and saturated steam
- (D) The evaporation of 15.653 kg of water per hour from and at 100°C
- **Answer:** Option (C)
  - 34. In forced draught boiler, the fan is placed:
  - (A) After the fire gate
  - (B) Before the fire gate
  - (C) None of these
  - (D) All of these
- Answer: Option (B)
  - 35. In an induced draught boiler, the fan is placed:
  - (A) After the fire gate
  - (B) Before the fire gate
  - (C) None of these
  - (D) All of these
- Answer: Option (A)
  - 36. In which type of boiler, pressure inside the furnace is above the atmospheric pressure?
  - (A) Induced draught boiler
  - (B) Forced draught boiler
  - (C) None of these.
  - (D) All of these
- Answer: Option (B)
  - 37. What is the main advantage of the usage of high-pressure boilers in a thermal plant?
  - (A) Lower price
  - (B) Increase in efficiency
  - (C) Only high-grade fuel can be burnt
  - (D) None of the given
- Answer: Option (B)
  - 38. In which type of boiler, pressure inside the furnace is below the atmospheric pressure?
  - (A) Induced draught boiler
  - (B) Forced draught boiler

- (C) None of these.
- (D) All of these
- **Answer:** Option (A)
  - 39. Which type of boiler requires more power to run?
  - (A) Induced draught boiler
  - (B) Forced draught boiler
  - (C) None of these.
  - (D) All of these
- **Answer:** Option (A)
  - 40. Which type of boiler requires less power to run?
  - (A) Induced draught boiler
  - (B) Forced draught boiler
  - (C) None of these.
  - (D) All of these
- Answer: Option (B)

### ESTD-1996

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# ZEAL EDUCATION SOCIETY'S ZEAL POLYTECHNIC,PUNE

NARHE | PUNE -41 | INDIA

DEPARTMENT OF MECHANICAL ENGINEERING



#### **Question Bank for Multiple Choice Questions**

Program: Diploma in Mechanical Engineering	Program Code:- ME
Scheme: I	Semester: Fifth
Course: Power Plant Engineering	Course Code: 22566

03- Steam and Gas Power Plant

Marks:14

#### **Content of Chapter:**

- 3.1 Steam power plant: Introduction, components, advantages and limitations
- 3.2 Fuel handling systems in power. Plants: types, components
- 3.3 Electro-Static Precipitators
- 3.4 Control systems of power plant Elements, Types, desirable characteristics.
- 3.5 Steam temperature control and feed water control systems.
- 3.6 Maintenance procedure of major components of Steam power plant.
- 3.7 Open and close cycle with constant pressure gas turbine power plant.
- 3.8 Components of gas turbine power plant

3.9 Methods to improve the thermal efficiency of a simple open cycle, constant pressure gas turbine power plant.

- 3.10 Advantages of gas turbine power plant over others.
- 3.11 Maintenance procedure of major components of gas turbine power plants
  - 1. Which of these is a 'fissile fuel'?
  - (A) Thorium
  - (B) Carbon
  - (C) Potassium
  - (D) Graphite
  - Answer: Option (A)
- **Explanation:** A fissile fuel is one that is based on a sustained chain reaction with neutrons of any energy.
  - 2. Which of these is a 'working fluid' in liquid phase?

- (A) Water
- (B) Steam
- (C) Mercury
- (D) Oxygen
- **Answer:** Option (A)

**Explanation:** The working fluid is water in liquid phase & steam in gas phase.

- 3. Which of these is an output of a 'Furnace'?
- (A) Fuel gas
- (B) Air
- (C) Flue gases
- Water vapor (D)
- Answer: Option (C)

Explanation: A furnace takes in a Fuel gas, Air & Water Vapour while it gives off Flue Gases.

#### 4. What kind of energy output is obtained from a 'Steam Power Plant'?

- (A) Heat energy
- (B) Sound energy
- (C) Electricity
- (D) Thermal energy
- **Answer:** Option (C)
- **Explanation:** A 'Steam Power Plant' is used primarily for electricity generation.
  - 5. What kind of a process does a 'Steam Power Plant' undergoes?
  - (A) Adiabatic
  - (B) Cyclic
  - (C) Irreversible
  - (D) Expansion
  - **Answer:** Option (B)
- As the internal energy change in the 'Steam Power Plant' is ZERO. Hence, the entire plant obeys Explanation: a Cyclic Process.
  - 6. Water that is fed back to the boiler by the pump is called?
  - (A) Adsorbate

- (B) Absorbate
- (C) Condenset
- (D) Condensate
- Answer: Option (D)

**Explanation:** The water feedback is from condenser & it's called condensate.

- 7. The net change in internal energy in a steam power plant is?
- (A) Positive
- (B) Negative
- (C) Zero
- (D) None of the mentioned

#### Answer: Option (C)

**Explanation:** As the steam power plant is based on a cyclic process. A cyclic process has a net change in internal energy=0.

#### 8. The product of efficiency & heat transferred to the working fluid is?

- (A) Net temperature change
- (B) Net work done
- (C) Net enthalpy change
- (D) None of the mentioned

#### **Answer:** Option (D)

**Explanation:** The formula of efficiency of a steam power plant is, Efficiency = net work done/net heat transferred

#### 9. What are the components of a Steam Power Plant?

- (A) Evaporator, Condenser, Boiler, Expansion valve
- (B) Evaporator, condenser, boiler, turbine
- (C) Boiler, turbine, condenser, pump
- (D) Boiler, Turbine, Pump, Expansion valve

#### Answer: Option (C)

- **Explanation:** A Steam Power Plant has the sequence, Boiler, Turbine, Condenser, Pump.
  - 10. Shaft work is fed to \_\_\_\_\_\_ for getting an electrical output.
  - (A) Motor
  - (B) Generator

- (C) Rotor
- (D) Accelerator
- **Answer:** Option (B)

**Explanation:** The flow in a Steam Power Plant follows the sequence, Source-Shaft-Generator.

- 11. The steam-electric power station is a power station in which the electric generator is steam driven.
- (A) True
- (B) False
- (C) Can be true or false
- (D) Cannot say
- Answer: Option (A)
- **Explanation:** True, The steam-electric power station is a power station in which the electric generator is steam driven
  - 12. Most electric power is produced by steam-electric power plants, which produce about \_\_\_\_\_\_ of all electric.
  - (A) 0.51
  - (B) 0.63
  - (C) 0.78
  - (D) 0.89
  - **Answer:** Option (D)

**Explanation:** Most electric power is produced by steam-electric power plants, which produce about 89% of all electric

- 13. The steam vapor picks up energy and is superheated \_\_\_\_\_\_ the saturation temperature.
- (A) Below
- (B) Above
- (C) Equal to
- (D) Cannot say
- **Answer:** Option (B)
- Explanation:

**:ion:** The steam vapor picks up energy and is superheated above the saturation temperature.

#### 14. Which part of thermal power plant causes maximum energy losses?

- (A) Alternator
- (B) Boiler
- (C) Condenser

- (D) Ash and unburnt carbon
- **Answer:** Option (C)

**Explanation:** About 54% of energy losses occur in condenser. Losses in boiler and alternator are about 1% and 16% because of such high losses overall efficiency of thermal power plant reduces to 29% for normal old thermal power plant and 50% for modern super critical pressure steam power plant which employs many heat saving devices.

#### 15. What is the effect of increasing steam pressure on efficiency of steam power plant?

- (A) Increases linearly
- (B) Increases nonlinearly
- (C) Decreases linearly
- (D) Does not changes

#### **Answer:** Option (B)

- **Explanation:** The thermal efficiency of steam power plant depends upon the steam pressure. The efficiency increases with increasing steam pressure nonlinearly up to a level. After that level increase in efficiency becomes very low with respect to increasing pressure.
  - 16. What is the principle of operation of steam power plant?
  - (A) Carnot cycle
  - (B) Brayton cycle
  - (C) Stirling cycle
  - (D) Rankine cycle
  - **Answer:** Option (D)

#### **Explanation:** The Rankine cycle is an idealized thermodynamic cycle of heat engine. Under this cycle heat energy is converted into mechanical energy while undergoing phase change. The heat is supplied externally to the closed loop which usually uses water as working fluid.

- 17. Which of the following material is not used in the boiler furnace walls?
- (A) Fire clay
- (B) Silica
- (C) Concrete
- (D) Kaolin
- **Answer:** Option (C)
- Explanation: Fire clay, Silica and Kaolin have property of resisting change in shape, weight or physical property at higher temperature. Concrete have no such properties at higher temperature so it is not suitable for that.
  - 18. Which of the following is not a type of steam turbine?

(A) Impulse turb	oine
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- (B) Reaction turbine
- (C) Pelton wheel turbine
- (D) Axial flow type turbine

#### Answer: Option (C)

- **Explanation:** Pelton wheel turbine is a water turbine. Impulse and reaction turbines are the steam turbines characterized by the action of steam on moving blades. Axial and radial flow turbine and steam turbines are characterized by type of flow of steam over blades
  - 19. Preheating the feed water reduces the irreversibility involved in steam generation
  - (A) True
  - (B) False
  - (C) Can be true or false
  - (D) Cannot say
  - Answer: Option (A)

**Explanation:** True, Preheating the feed water reduces the irreversibility involved in steam generation.

20. Geothermal plants need \_\_\_\_\_ boiler

- (A) 0
- (B) 1
- (C) 2
- (D) 3

#### Answer: Option (A)

**Explanation:** True, Geothermal plants need no boiler since they use naturally occurring steam sources.

21. What is the air standard cycle for a Gas-Turbine called?

- (A) Reheat cycle
- (B) Rankine cycle
- (C) Brayton cycle
- (D) Diesel cycle

#### Answer: Option (C)

**Explanation:** Brayton cycle is an ideal air standard cycle for a Gas turbine, which, like the Rankine cycle, also comprises of two reversible adiabatic & two reversible isobars.

22. What is the difference between a Rankine cycle & a Brayton cycle?

(A)	working fluid in a Brayton cycle undergoes phase change while it doesn't in Rankine cycle
(B)	working fluid in a Brayton cycle doesn't undergo phase change while it does in Rankine cycle
(C)	both are same
(D)	none of the mentioned
Answer:	Option (B)
Explanation:	The difference between a Rankine cycle & a Brayton cycle is that the working fluid in a Brayton cycle doesn't undergo phase change while it does in Rankine cycle.
23.	Which of the following is a type of Gas Turbine Plant?
(A)	Single Acting
(B)	Double Acting
(C)	Open III
(D)	None of the mentioned
Answer:	Option (C)
Explanation:	Open & Closed Gas Turbine plants are the two types.
24.	Power is produced when the working fluid does some work on the?
(A)	Shaft
(B)	Fins
(C)	Blades
(D)	None of the mentioned
Answer:	Option (C)
Explanation:	For the production of power, the working fluid does some work on the blades of the turbine, thereby producing Power.
25.	A Gas Turbine is which type of combustion plant?
(A)	external
(B)	open
(C)	internal
(D)	cannot say
Answer:	Option (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.
26.	Which among these is the main component of a gas turbine plant?
(A)	Condenser

(B)	Compressor
-----	------------

- (C) Boiler
- (D) Both Compressor & Boiler
- **Answer:** Option (B)

**Explanation:** The main component of a Gas turbine plant is Compressor.

- 27. Which type of compressor is used in a gas turbine plant?
- (A) Reciprocating compressor
- (B) Screw compressor
- (C) Multistage axial flow compressor
- (D) Either Reciprocating compressor & Screw compressor
- **Answer:** Option (C)

**Explanation:** Multistage axial flow compressor is the compressor in practical usage in a gas turbine plant.

#### 28. 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:** Option (D)
- **Explanation:** Natural gas and liquid petroleum fuel are among the two fuels used in a gas turbine.

#### **29.** 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:** Option (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.
  - **30.** Which of the following is not used in gas turbine power plant?
  - (A) Compressor
  - (B) Turbine

- (C) Combustion chamber
- (D) Condenser

Answer: Option (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
  - 31. 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: Option (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
  - 32. 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:** Option (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.
  - 33. 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: Option (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.
  - 34. 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: Option (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.

- 35. 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: Option (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

- 36. What is demand factor of commercial consumers?
- (A) Low
- (B) Medium
- (C) High
- (D) More than 1

#### Answer: Option (C)

**Explanation:** Demand factor is the ratio of maximum demand to connected load. As we know maximum demand cannot be greater than connected load so demand factor is always less than one. Commercial consumer generally used as most of disconnected loads so their demand factor is high.

If an industrial consumer consumes 50KW for 4 hours, 300KW for 15 hours and 60KW for 5 37. hours daily and the tariff rate is Rs 5/KWh. What is the energy consumption in a month of

- 30 days?
- (A) Rs 750000
- (B) Rs 475000
- (C) Rs 755000
- (D) Rs 470000

Answer:	Option	(A)
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- Explanation: Energy Consumed in one day = (50×4 + 300×15 + 60×5) KWh = 5000 KWh Energy Consumed in one month = 5000× 30 = 150000 KWh Hence, Charge on one month = 150000 × 5 =750000 Rupees.
  - 38. Monthly consumption of a consumer is 500KWh. What will be the monthly bill at the following rate? First 100 unit Rs 0.6/KWh Next 100 units Rs 0.5/KWh Remaining units Rs 0.4/KWh
  - (A) Rs 250
  - (B) Rs 25
  - (C) Rs 230
  - (D) Rs 23

**Answer:** Option (C)

**Explanation:** 500 KWh = (100 + 100 + 300) KWh Bill for one month consumption

- = (100×0.6 + 100×0.5 + 300×0.4) Rupees = 230 Rupees.
- **39.** An electricity supplier is charging for the electricity as per the total load connected, fixed number of hours. This type of tariff will be a \_\_\_\_\_\_
- (A) Simple tariff
- (B) Flat demand tariff
- (C) Flat rate tariff
- (D) Block rate tariff

#### **Answer:** Option (B)

- **Explanation:** When the use of Electricity was mainly restricted to very few applications such as for lamps and the number of hours of use of lamp were fixed they were charged on the basis of total load connected in Kilowatt and the fixed number of hours of use district is known as flat demand tariff.
  - 40. What part or % of power developed is utilized for driving the compressor?
  - (A) 65 %
  - (B) 70 %
  - (C) 55 %
  - (D) 80 %

#### Answer: Option (A)

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

- 41. 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:** Option (C)

**Explanation:** Open & Closed Gas Turbine plants are the two types.



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# ZEAL EDUCATION SOCIETY'S ZEAL POLYTECHNIC,PUNE

NARHE | PUNE -41 | INDIA

DEPARTMENT OF MECHANICAL ENGINEERING



#### **Question Bank for Multiple Choice Questions**

Program: Diploma in Mechanical Engineering	Program Code:- ME
Scheme: I	Semester: Fifth
Course: Power Plant Engineering	Course Code: 22566

04- Waste Heat Recovery, Cogeneration and	Marke:08		
Trigeneration	Marks.00		
Content of Chapter:			
4.1 Waste heat recovery in thermal power plants: Needs, opportunities, present practices.			

- 4.2 Cogeneration: Need, opportunities, present practices.
- 4.3 Trigeneration: Need, opportunities, present practices.

1. Turbines that are run by exhaust gases are called \_\_\_\_

- (A) power recovery turbines
- (B) stepped turbines
- (C) turbo compounded engine
- (D) none of the mentioned

#### **Answer:** Option (A)

Explanation: Turbines that are run by exhaust gases are called power recovery turbines

- 2. Combination of two or more thermodynamic processes gives \_\_\_\_
- (A) decrease in efficiency
- (B) increase in efficiency
- (C) increases the temperature at exhaust
- (D) none of the mentioned
- **Answer:** Option (B)

**Explanation:** When two or more thermodynamic cycles work together their overall combined efficiency increases by 50-60%.

3.	Why Reheating of steam is used?
(A)	to increase efficiency
(B)	to increase work output
(C)	to increase Turbine Inlet Temperature
(D)	to reduce amount of fuel used
Answer:	Option (B)
Explanation:	Work output = work done by turbine – work done by compressor
4.	Reheating of steam
(A)	decreases steam rate
(B)	increases steam rate
(C)	no effect on steam rate
(D)	none of the mentioned
Answer:	Option (A)
Explanation:	Since work output increases the steam rate decreases.
5.	Efficiency of cycle will increase due to Reheating if
(A)	mean temperature of heat addition in boiler is higher than in reheat process
(B)	mean temperature of heat addition in boiler is lower than in reheat process
(C)	it will increase without any conditions
(D)	it will not increase
Answer:	Option (A)
Explanation:	Efficiency = work output / heat supplied, heat supplied is less in this condition only
6.	Having two separate units for process heat and power is?
(A)	useful
(B)	useless
(C)	pollution reducing
(D)	none of the mentioned
Answer:	Option (B)
Explanation:	Having two separate units for process heat & power is wasteful, for of the total heat supplied to the steam generator for power purposes, a greater part will normally be carried away by the cooling water in the condenser.

7. A plant producing both, electrical power & process heat simultaneously is?

(A)	Cogenital p	lant
V		

- (B) Cogenerial plant
- (C) Cogeneration plant
- (D) Conglomerate plant

#### Answer: Option (C)

**Explanation:** Cogeneration plant is defined as a plant which produces electrical power and processes heat simultaneously.

- 8. In a back pressure turbine \_\_\_\_
- (A) pressure at the exhaust from the turbine is the saturation pressure corresponding to the temperature desired in the process
- (B) pressure at the entrance of the turbine is the saturation pressure corresponding to the temperature desired in the process
- (C) pressure at the exhaust from the turbine is the saturation pressure corresponding to the pressure desired in the process
- (D) none of the mentioned
- **Answer:** Option (C)

### **Explanation:** The name back pressure turbine is given because pressure at the exhaust from the turbine is the saturation pressure corresponding to the temperature desired in the process.

- 9. In a by-product power cycle?
- (A) the power is produced initially
- (B) power production is in the middle stages of the cycle
- (C) power production is after the cycle has ended
- (D) none of the mentioned

#### Answer: Option (C)

- **Explanation:** When the process steam is the basic need, and the power is produced incidentally as a by-product, the cycle is often called as the by-product power cycle.
  - 10. Back pressure turbines are usually \_\_\_\_\_\_ with respect to their power output.
  - (A) large
  - (B) small
  - (C) very large
  - (D) very small

#### Answer: Option (B)

- **Explanation:** Back pressure turbines are usually small with respect to their power output because they have no great volume of exhaust to cope with, the density being high.
  - 11. In terms of cost per MW compared to condensing sets of the same power, the back pressure turbines are?

- (A) more expensive
- (B) cheaper
- (C) costly
- (D) none of the mentioned

#### Answer: Option (B)

- **Explanation:** Back pressure turbines are usually small with respect to their power output because they have no great volume of exhaust to cope with, the density being high. They are usually single cylinder and hence, usually cheaper in terms of cost per MW.
  - 12. Which of these is not an application of back pressure turbine?
  - (A) desalination of sea water
  - (B) filtration of water
  - (C) process industries
  - (D) petrochemical installations
  - Answer: Option (B)
- **Explanation:** The applications of back pressure turbine are desalination of sea water, process industries, petrochemical installations, district heating and also for driving compressors and feed pumps.
  - 13. Which of these is not considered economical for cogeneration?
  - (A) a high fraction of electric to total energy
  - (B) a low fraction of electric to total energy
  - (C) a low fraction of total energy to electric energy
  - (D) none of the mentioned

#### Answer: Option (B)

- **Explanation:** A low fraction of electric to total energy is considered as an economical condition for cogeneration. Cogeneration plant is defined as a plant which produces electrical power and processes heat simultaneously
  - 14. How many sections does waste heat recovery boiler have in steam generators?
  - (A) 1
  - (B) 2
  - (C) 3
  - (D) 4
  - **Answer:** Option (C)
- **Explanation:** In steam generators waste heat recovery boilers have 3 sections. They are Economizer, Evaporator Superheater.

#### 15. In a by-product power cycle?

- (A) the power is produced initially
- (B) power production is in the middle stages of the cycle
- (C) power production is after the cycle has ended
- (D) none of the mentioned
- **Answer:** Option (C)

Explanation: when the process steam is the basic need, and the power is produced

- 16. Which of these is a working fluid in the bottoming plant of a Brayton-Rankine combined plant?
- (A) mercury
- (B) steam
- (C) water
- (D) air
- Answer: Option (C)

**Explanation:** Water is the bottoming fluid due to its high specific heat capacity.

- 17. What is regeneration?
- (A) removal of heat from compressed air between stages of compression
- (B) transfer of heat energy from exhaust gases to the compressed air flowing between compressor and the combustion chamber
- (C) to increase the temperature of partially expanded gases by burning more fuel
  - transfer of heat energy from exhaust gases to the compressed air flowing between compressor
- (D) and the combustion chamber and increases the temperature of partially expanded gases by burning more fuel
- **Answer:** Option (b)

**Explanation:** Transfer of heat energy from exhaust gases to the compressed air flowing between compressor and the combustion chamber is called the process of regeneration.

- 18. What is meant by inter cooling?
- (A) removal of heat from compressed air between stages of compression
- (B) transfer of heat energy from exhaust gases to the compressed air flowing between compressor and the combustion chamber
- (C) to increase the temperature of partially expanded gases by burning more fuel
- (D) none of the mentioned
- Answer: Option (A)

Explanation: Removal of heat from compressed air between various stages of compression is called inter

cooling.

- 19. Advantages of Trigeneration power plant as
- (A) Onsite, high efficiency production of electricity and heat
- (B) Reduced fuel and energy costs
- (C) Lower electrical usage during peak summer demand
- (D) All of the mentioned
- **Answer:** Option (D)

**Explanation:** In trigeneration power plant high efficiency production is carried out along with reduced fuel cost and lower electrical usage during peak summer demand

#### 20. Trigeneration is the process of\_

- (A) Production of electricity by conventional means
- (B) Production of electricity by steam Turbine
- (C) Production of combined cooling, heat, and power from a single generator or process
- (D) None of the above
- **Answer:** Option (C)

**Explanation:** Trigeneration is the process of production of combined cooling, heat, and power from a single generator or process

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### ZEAL EDUCATION SOCIETY'S ZEAL POLYTECHNIC,PUNE

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DEPARTMENT OF MECHANICAL ENGINEERING



#### **Question Bank for Multiple Choice Questions**

Program: Diploma in Mechanical Engineering	Program Code:- ME
Scheme: I	Semester: Fifth
Course: Power Plant Engineering	Course Code: 22566

05- Nuclear Power Plant	Marks:12		
Content of Chapter:			
5.1 Nuclear Power Plant: Classification, General arrangement, operating principles			
5.2 Nuclear fuels and reactors			
5.3 Advantages and limitations			
5.4 Introduction to regulating agencies and regulations: Atomic Energy Regulatory Board (AERB), International			
Atomic Energy Agency (IAEA)			

- 1. The best capable alternative source which can meet the future energy demand is \_
- (A) thermal power plant
- (B) nuclear power plant
- (C) hydroelectric power plant
- (D) geothermal power plant

#### Answer: Option (B)

**Explanation:** Demand of electrical energy is increasing at fast rate owing to booming increase in the population and industrial growth. The reserves of fossil fuel i.e., coal, oil and gas are fast depleting. There are many alternative sources of energy but they are not enough to supply such huge demand, only nuclear power plants are capable of doing that.

- 2. How much coal is required to generate energy equivalent to the energy generated by 1 kg of uranium?
- (A) 30000 tonnes of high grade coal
- (B) 300 tonnes of high grade coal
- (C) 10000 tonnes of high grade coal

(D) 3000 tonnes of high grade coal

#### **Answer:** Option (D)

Explanation:

One of the main attention for nuclear fuel is the huge amount of energy that can be released from a small quantity of active nuclear fuel. The energy obtainable by completely using 1 kg of Uranium would give energy equivalent 3000 tons of high grade coal i.e. Uranium has three millions times the energy of coal

3. Nuclear fuel in reactor lasts for \_\_\_\_\_

- (A) more than 5 months
- (B) few weeks
- (C) few days
- (D) more than 5 years

#### Answer: Option (D)

**Explanation:** Very small amount of nuclear fuel can produce very high amount of energy. Nuclear fuel may remain in a reactor for more than 5 years

#### 4. Cost of nuclear fuel in nuclear power plant economics is considered as \_\_\_\_\_

- (A) running cost
- (B) maintenance cost
- (C) capital cost
- (D) development cost

#### Answer: Option (C)

**Explanation:** Nuclear fuel in a nuclear reactor may remain for more than 5 years. So the cost of fuel injected initially is taken as capital cost and may be a few crore rupees

- 5. What is the overall efficiency of nuclear power plant?
- (A) 20 to 25%
- (B) 25 to 30%
- (C) 30 to 40 %
- (D) 50 to 70 %

#### Answer: Option (C)

**Explanation:** The overall efficiency of a nuclear power plant is around 30 to 40%. Efficiency is higher at high road factors. Therefore, a nuclear power plant is always operated as a base load plant.

#### 6. The land area required for installation of nuclear power plant is \_\_\_\_\_

- (A) more than thermal power plant
- (B) less than thermal power plant

- (C) equal to thermal power plant
- (D) depends on type of construction

#### **Answer:** Option (C)

Explanation: Nuclear power plants need less area as compared to any other plant of same generation capacity.A 2000MW nuclear power plant needs about 80 acres whereas the coal fired steam power plant of same generation capacity needs 250 acres of land.

- 7. Graphite and beryllium can be used as \_\_\_\_\_ in a nuclear plant.
- (A) Control rods
- (B) Moderator
- (C) Coolant
- (D) Reflector

#### Answer: Option (B)

- **Explanation:** The main purpose of the moderator is to reduce the neutron speeds to a value that increases the possibility of fission reaction, the main moderators are graphite, heavy water and beryllium. Ordinary water is used along with enriched uranium.
  - 8. The common materials that can be used as the control rods are \_\_\_\_\_.
  - (A) Germanium and beryllium
  - (B) Hafnium
  - (C) Cadmium and boron
  - (D) Both (b) & (c)
  - Answer: Option (D)
- Explanation: Control rods are made up of Hafnium, Cadmium and boron
  - 9. The power output from a nuclear power station is proportional to \_\_\_\_\_
  - (A) Square of the rate at which fission reaction occurs.
  - (B) Square root of the rate at which fission reaction occurs.
  - (C) The rate at which fission reaction occurs.
  - (D) None of the above
  - Answer: Option (C)
- **Explanation:** The rate at which fission reaction occurs.
  - 10. Country with the highest uranium resources
  - (A) Australia
  - (B) Canada

- (C) Namibia
- (D) Niger
- Answer: Option (A)
- Explanation: Highest uranium resources available Australia
  - 11. Boiling water reactor contains number of loops
  - (A) Six
  - (B) Four
  - (C) Two
  - (D) One
  - Answer: Option (D)
- Explanation: In Boiling water reactor only one loop is present
  - 12. Nuclear reactors are used
  - (A) to produce heat for thermoelectric power
  - (B) to produce fissionable material
  - (C) to propel ships, submarines, aircrafts
  - (D) all of these
  - Answer: Option (D)
- Explanation: No answer description available for this question
  - 13. A moderator generally used in nuclear power plants is
  - (A) graphite
  - (B) heavy water
  - (C) concrete
  - (D) graphite and concrete

#### Answer: Option (B)

- **Explanation:** A substance, such as graphite, water, or heavy water, placed in a nuclear reactor to slow neutrons down to speeds at which they are more likely to be captured by fissionable components of a fuel (such as uranium-235) and less likely to be absorbed by non-fissionable components of a fuel (such as uranium-238). Also called neutron moderator. & concrete it's not a moderator.
  - 14. The predominant isotope of the naturally occurring element is
  - (A) U<sub>235</sub>
  - (B) U<sub>238</sub>

- (C) Pu<sub>233</sub>
- (D) Pu<sub>239</sub>

Answer: Option (B)

- **Explanation:** Uranium-238 is the most common isotope of uranium found in nature. It is not fissile, but is a fertile material, it can capture a slow neutron and after two beta decays become fissile plutonium-239
  - 15. A moderator, in nuclear power plants, is a medium introduced into the fuel mass in order to
  - (A) slow down the speed of fast moving neutrons
  - (B) control the reaction
  - (C) reduce the temperature
  - (D) extract heat from nuclear reaction
  - Answer: Option (A)

In nuclear engineering, a neutron moderator is a medium that reduces the speed of fast neutrons,

Explanation:

thereby turning them into thermal neutrons capable of sustaining a nuclear chain reaction involving uranium-235.

#### 16. The reflectivity depends upon

- (A) Geometry of the reflector
- (B) energy of neutrons
- (C) properties of the reflector
- (D) properties of the reflector
- Answer: Option (B)
- **Explanation:** properties of the reflector
  - 17. Which power plant requires highest initial cost and minimum cost of fuel transportation?
  - (A) Diesel power plant
  - (B) Steam power plant
  - (C) Nuclear power plant
  - (D) Hydro-electric power plant
  - Answer: Option (C)
- **Explanation:** The amount of fuel required is quite small. Therefore, there is the minimum cost of fuel transportation.
  - 18. The first nuclear plant was built in India at
  - (A) Rana Pratap Sagar

- (B) Padghe
- (C) Kalpakkam
- (D) Tarapur
- Answer: Option (D)

Explanation: It was the

1: It was the first commercial atomic power station of India commissioned on 28th October 1969

- 19. The purpose of moderator in the reactor core of a nuclear power plant is to
- (A) Reduce the neutron speed
- (B) Break uranium atoms
- (C) Shut down the reactor
- (D) Heat the coolant

#### Answer: Option (A)

- **Explanation:** The fuel rods constitute the fission material and release a huge amount of energy when bombarded with slow-moving neutrons
  - 20. The main function of shielding in nuclear reactor is provide protection against
  - (A)  $\alpha$  rays
  - (B)  $\beta$  rays
  - (C) γ rays
  - (D) None of these
  - Answer: Option (C)
- **Explanation:** The shielding of charged particle radiation is therefore a much less severe problem and shielding is done to protect against highly energetic neutrons and gamma rays
  - 21. Which of the following is NOT a coolant used for fast breeder reactor?
  - (A) Carbon Dioxide
  - (B) Oxygen
  - (C) Liquid metal
  - (D) Helium
  - Answer: Option (B)

**Explanation:** The commonly used coolants for fast breeder reactors are as follows: Liquid metal (Na or NaK), Helium (He) and carbon dioxide

- 22. The best capable alternative source which can meet the future energy demand is
- (A) thermal power plant
- (B) hydroelectric power plant

- (C) nuclear power plant
- (D) geothermal power plant
- **Answer:** Option (C)
  - 23. Nuclear fuel in reactor lasts for.....
  - (A) more than 5 months
  - (B) few weeks
  - (C) few days
  - (D) more than 5 years
- Answer: Option (D)
  - 24. Cost of nuclear fuel in nuclear power plant economics is considered as
  - (A) running cost
  - (B) capital cost
  - (C) maintenance cost
  - (D) development cost
- Answer: Option (B)
  - 25. In economics of nuclear power plant taxes and insurance charges are taken as.....
  - (A) operating cost
  - (B) capital cost
  - (C) maintenance cost
  - (D) fixed cost
- Answer: Option (D)
  - 26. The land area required for installation of nuclear power plant is
  - (A) more than thermal power plant
  - (B) less than thermal power plant
  - (C) equel to thermal power plant
  - (D) depends on type of construction

#### Answer: Option (B)

- 27. With respect to the load centre which location is suitable for establishment of nuclear power plant
- (A) Load centre

- (B) Near load centre but at reasonable distance
- (C) Far away from load centre
- (D) Near chemical industries
- **Answer:** Option (B)
  - 28. The efficiency of a nuclear power plant in comparison to a conventional thermal power plant is
  - (A) same
  - (B) more
  - (C) less
  - (D) may be less or mote depending on size
- **Answer:** Option (D)
  - 29. Amongst the following, the fissionable materials are
  - (A) U233andPu239
  - (B) U23iandPu233
  - (C) U235andPu235
  - (D) U238andPu239

#### Answer: Option (A)

- 30. A nuclear unit becoming critical means
- (A) it is generating power to rated capacity
- (B) it is capable of generating much more than rated capacity
- (C) there is danger of nuclear spread
- (D) chain reaction that causes automatic splitting of the fuel nuclei has been established\
- **Answer:** Option (D)
  - 31. The nuclear energy is measured as
  - (A) MeV
  - (B) curie
  - (C) farads
  - (D) MW
- **Answer:** Option (A)
  - 32. The total energy released in fission of U is

- (A) 5 MeV
- (B) 10 MeV
- (C) 199 MeV
- (D) 168 MeV

#### **Answer:** Option (C)

- 33. Breeder reactor has a conversion ratio of
- (A) unity
- (B) more than unity
- (C) less than unity
- (D) zero

#### Answer: Option (B)

- 34. Boiling water reactor employs
- (A) boiler
- (B) direct cycle of coolant system
- (C) double circuit system of coolant cycle
- (D) multi pass system

#### **Answer:** Option (B)

- 35. Fast breeder reactor uses
- (A) boiler
- (B) direct cycle of coolant system
- (C) double circuit system of coolant cycle
- (D) multi pass system
- Answer: Option (C)

Explanation: In fast breeder reactor double circuit system of coolant is used for faster cooling

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#### ZEAL EDUCATION SOCIETY'S ZEAL POLYTECHNIC, PUNE

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DEPARTMENT OF MECHANICAL ENGINEERING



#### **Question Bank for Multiple Choice Questions**

Program: Diploma in Mechanical Engineering	Program Code:- ME	
Scheme: I	Semester: Fifth	
Course: Power Plant Engineering	Course Code: 22566	
× s.	A.1.10 A. T	
06- Economic Analysis of Power Plants	Marks:12	

06- Economic Analysis of Power Plants

#### **Content of Chapter:**

- 6.1 Estimation of production cost of electrical energy in various types of power plants.
- 6.2 Estimation of performance parameters
- 6.3 Factor affecting choice of a power plants

1. What is the advantage of sectionalizing of power plant?

- (A) High reliability
- (B) Low capital cost
- (C) Low maintenance
- (D) Easy operation

#### Answer: Option (A)

- Sectionalizing means installing more number of small units rather than installing a big unit. Doing Explanation: so enables us to maintain continuity of supply from rest of the units, when one or two units of plant fails. this makes the plant more reliable.
  - The area under the load curve represents \_
  - (A) the average load on power system
  - (B) maximum demand
  - (C) number of units generated
  - (D) load factor

#### **Answer:** Option (C)

**Explanation:** Load curve is obtained by plotting fluctuating load be keeping load on y axis and time in x axis. The area under the load curve represents the total number of units generated in a particular time

- 3. Which of the following is equal to the maximum demand?
- (A) The ratio of area under curve to the total area of rectangle
- (B) The ratio of area under curve and number of hours
- (C) The peak of the load curve
- (D) The area under the curve
- **Answer:** Option (C)
- **Explanation:** The ratio of area under curve to the total area of the rectangle is called load factor. The ratio of area under the curve to the number of hours represents the average load. The peak of the curve represents the maximum demand.
  - 4. Load duration curve indicates
  - (A) the variation of load during different hours of the day.
  - (B) total number of units generated for the given demand
  - (C) total energy consumed by the load
  - (D) the number of hours for which the particular load lasts during a day

#### **Answer:** Option (D)

- **Explanation:** The variation of load during different hours of the day is shown by load curve. Load duration curve is different from Load curve. Load duration curve indicates the variation of the load, but with the load arranged in descending order of magnitude. Load duration curve give the number of hours for which a particular load lasts during a day.
  - 5. During which time the demand of electrical energy is maximum?
  - (A) 2 A.M. to 5 A.M.
  - (B) 5 A.M. to 12 P.M.
  - (C) 12 P.M. to 7 P.M.
  - (D) 7 P.M. to 9 P.M

#### Answer: Option (D)

- **Explanation:** From the load curve it is obtained that during early morning demand is always low. Around 5 A.M. it starts increasing and around 9 A.M. load reaches a high value and remains almost constant till evening except for some Dip during lunch hours. The load again starts increasing in evening hours and reaches its peak around 7 to 9 P.M.
  - Size and cost of installation depends upon \_\_\_\_\_
  - (A) average load
  - (B) maximum demand

- (C) square mean load
- (D) square of peak load

#### Answer: Option (B)

Explanation:

The greatest of all "short time interval averaged" during a given period, on the power system is called the maximum demand. Maximum demand represents the maximum amount of load that is active, out of total connected load. So the size and rating of power plant depends on Maximum demand

#### 7. What is Demand factor?

- (A) Ratio of connected load to maximum demand
- (B) Ratio of average load to connected load
- (C) Ratio of maximum demand to the connected load
- (D) Ratio of kilowatt hour consumed to 24 hours

#### **Answer:** Option (C)

# **Explanation:** Demand factor is the ratio of actual maximum demand on the system to the total load connected to the system. The idea of demand factor was introduced due to the fact that all the equipments connected to the system does not work at a time in practice

#### 8. Which of the following represents the annual average load?

- (A) (KWh supplied in a day)/24
- (B) {(KWh supplied in a day)/ 24 } × 365
- (C) {(KWh supplied in a month)/ $(30 \times 24)$
- (D) (KWh supplied in a year) / (24 × 365)

#### **Answer:** Option (D)

- **Explanation:** The average load on the power station is average of load occurring at the various events. It can also be stated as energy deliver in a given period divided by the number of hours in that period. Option d matches correctly to these statements.
  - 9. The load factor is
  - (A) always less than unity
  - (B) less than or greater than 1
  - (C) always greater than 1
  - (D) less than zero

#### Answer: Option (A)

- **Explanation:** Load factor is the ratio of average demand to the maximum demand. Average demand can not be greater than maximum demand. So the value of load factor is always less than unity.
  - 10. In practice what is the value of diversity factor?

- (A) Less than Unity
- (B) Greater than Unity
- (C) Equal to or greater than Unity
- (D) Less than zero

#### Answer: Option (B)

- **Explanation:** Maximum demand of different consumers never occurs at a time, due to this the total maximum demand of the load is always less than sum of individual maximum demands. And hence, demand factor e.g. the ratio of sum of individual maximum demand to the maximum demand of total load is always greater than unity.
  - 11. Coincidence factor is reciprocal of
  - (A) average load
  - (B) demand factor
  - (C) capacity factor
  - (D) diversity factor
  - Answer: Option (D)

**Explanation:** Coincidence factor is the ratio of total maximum demand to the sum of individual maximum demands which is the reciprocal of diversity factor.

- 12. Which of the following is called as cold reserve?
- (A) Reserve capacity available but not ready for use
- (B) Reserve capacity available and ready for use
- (C) Generating capacity connected to bus and ready to take load
- (D) Capacity in service in excess of peak load

#### **Answer:** Option (A)

**Explanation:** Cold reserve is the generating capacity which is available for service but not normally ready for immediate loading. Reserved capacity available and ready to use are called hot reserve.

- 13. Which of the following costs come under semi fixed cost?
- (A) Salaries of high officials
- (B) Salaries of operational and maintenance staff
- (C) Salaries of Management and clerical staff
- (D) Annual cost of fuel
- **Answer:** Option (C)
- **Explanation:** The semi fixed cost is due to annual interest, the capital cost of generating plant transmission and distribution network building and other civil works, all types of taxes and insurance charges and salaries of Management and clerical staff. Salaries of higher officer are a fixed cost and salaries of

operation and maintenance staff is running or operating cost.

- 14. Which power plant has minimum operating cost?
- (A) Thermal power plant
- (B) Hydroelectric power plant
- (C) Thermal power plant
- (D) Nuclear power plant
- Answer: Option (B)
- **Explanation:** Hydroelectric power plant has lowest running cost because it does not needs any fuel and can be operated by few numbers of persons. Nuclear gas and thermal power plant requires fuels also the handling cost of fuels is added with the total cost.
  - 15. Which of the following have highest operating cost?
  - (A) Hydroelectric power plant
  - (B) Thermal power plant
  - (C) Nuclear power plant
  - (D) Solar electric power plant

#### **Answer:** Option (B)

Explanation:

Operating cost of hydroelectric and Solar Power Plant are very low because they don't need fuel. In nuclear power plant fuel required is of very small quantity as compared to coal required by thermal power plant. Due to above the cost of transportation of fuel and also the cost of fuel itself is low for nuclear power plant.

- 16. Which of the following least affect the cost of electricity produced in thermal power plant?
- (A) Cost of fuel
- (B) Cost of transportation
- (C) The load factor
- (D) Salaries of higher officials

#### Answer: Option (D)

**Explanation:** Change in fuel cost by 20% main cause about 8% variation in total cost per KWh generated. Cost of transportation and the load factor changes and also cause variation in fuel cost. The salaries of higher officials come under fixed cost and so it does not affect the cost of fuel.

- 17. Which of the following power plant have longest physical life?
- (A) Thermal power plant
- (B) Nuclear power plant
- (C) Hydroelectric power plant

- (D) Diesel power plant
- Answer: Option (C)
- **Explanation:** Thermal and diesel power plants are so constructed that their efficiency falls over time faster as compared to hydroelectric power plant. Nuclear power plant also needs maintenance over time. The components of hydroelectric power plant including turbine, generator and the concrete Dam are so rugged in construction that their life maybe as long as 80 years or even longer.
  - 18. When load factor and diversity factor increases \_\_\_\_\_
  - (A) cost of electricity decreases
  - (B) cost of electricity also increases
  - (C) cost of electricity remains same
  - (D) cost of electricity increases exponential

#### Answer: Option (A)

**Explanation:** Load factor and diversity factor plays an important role in cost of supply of electrical energy. Higher the value of load factor and diversity factor, lower will be the cost per unit generated.

#### 19. Which of the following has highest diversity factor?

- (A) Domestic lightning
- (B) Commercial lightning
- (C) Industrial power
- (D) Domestic power
- Answer: Option (A)

**Explanation:** Diversity factor of all of the options rangers from 1.5 to 2. The diversity factor of domestic lightning up to 1 kilo watt rangers from 3 to 5.

- 20. Load factor of a power station is defined as
- (A) maximum demand/average load
- (B) average load x maximum demand
- (C) average load/maximum demand
- (D) (average load x maximum demand)172
- Answer: Option (C)
- Explanation: By definition
  - 21. Depreciation charges are high in case of
  - (A) thermal plant
  - (B) diesel plant

- (C) hydroelectric plant
- (D) Nuclear power plant
- Answer: Option (A)
  - 22. Which plant can never have 100 percent load factor?
  - (A) Peak load plant
  - (B) Base load plant
  - (C) Nuclear power plant
  - (D) Hydroelectric plant
- Answer: Option (A)
  - 23. Diversity factor has direct effect on the
  - (A) fixed cost of unit generated
  - (B) running cost of unit generated
  - (C) both (a) and (b)
  - (D) neither (a) nor (b)
- Answer: Option (A)
  - 24. Annual operating expenditure of a power plant consists of
  - (A) fixed charges
  - (B) semi-fixed charges
  - (C) running charges
  - (D) all of the above
- Answer: Option (D)
  - 25. Annual installment towards depreciation reduces as rate of interest increases with
  - (A) sinking fund depreciation
  - (B) straight line depreciation
  - (C) reducing balances depreciation
  - (D) none of the above
- Answer: Option (A)
  - 26. Annual depreciation of the plant it proportional to the earning capacity of the plant vide
  - (A) sinking fund depreciation
  - (B) straight line depreciation

- (C) reducing balances depreciation
- (D) none of the above
- **Answer:** Option (C)
  - 27. For high value of diversity factor, a power station of given installed capacity will be in a position to supply
  - (A) less number of consumers
  - (B) more number of consumers
  - (C) neither (a) nor (b)
  - (D) either (a) or (b)
- **Answer:** Option (B)
  - 28. Can generate power at unpredictable or uncontrolled times,
  - (A) Solar power plant
  - (B) Tidal power plant
  - (C) Wind power plant
  - (D) Any of the above
- Answer: Option (D)
  - 29. A low utilization factor for a plant indicates that
  - (A) plant is used for stand by purpose only
  - (B) plant is under maintenance
  - (C) plant is used for base load only
  - (D) plant is used for peak load as well as base load
- Answer: Option (A)
  - 30. What all components are included in the annual operating cost?
  - (A) Fuel, maintenance cost and labour.
  - (B) Interest, taxes, insurance and depreciation.
  - (C) Both (a) and (b)
  - (D) None of these.
- **Answer:** Option (A)
  - 31. What is the reserve capacity, if the maximum demand of generation of power is 50 MW, the load factor of the plant is 60% and the plant capacity factor is 50%?
  - (A) 15 MW

- (B) 10 MW
- (C) 20 MW
- (D) 6 MW

```
Answer: Option (B)
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**Explanation:** Load factor=average demand/maximum demand Average demand = (50) (0.6) = 30 MW Plant capacity factor = average demand\*plant capacity Plant capacity =30\*0.5=60 MW Reserve capacity = Plant Capacity – Maximum Demand = 60 - 50 = 10 MW Consumer consumes 600 kWh per day at a load factor of 0.5. Without increasing the

- 32. maximum demand, if the consumer increases the load factor to 0.8, the consumption of energy in kWh would be:
- (A) 480
- (B) 960
- 900 (C)
- (D) 300

```
Answer: Option (B)
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Explanation: Given load factor = 0.5

Average energy consumed at 0.5 load factor = 600 kWh Maximum energy consumed = 600/0.5 = 1200 kWh Now maximum energy consumed is constant and load factor is increased to 0.8 Average energy consumed = load factor × maximum energy consumed  $= 0.8 \times 1200$ = 960 kWh A power station has 4 consumers with their maximum demand as 40 MW, 20 MW, 30 MW 33. and 50 MW. The maximum demand of the station is 100 MW. The diversity factor of the plant is . (A) 0.5 (B) 0.2 (C) 1.4

(D) 0.35

**Answer:** Option (C)

**Explanation:** Sum of maximum individual demand = 40 + 20 + 30 + 50 = 140 MW Maximum demand of the station = 100 MW Diversity factor =140/100 = 1.4

#### 34. Utilization factor of a power station is the ratio of:

(A) Maximum demand of a power station to the sum of individual maximum demands

- (B) Average demand to the rated capacity of the power station
- (C) Sum of individual maximum demands to maximum demand of a power station
- (D) Maximum demand on the power station to the rated capacity of the power station

Answer: Option (D)

**Explanation:** It is the ratio of maximum demand on the power station to the rated capacity of the power station. Utilization factor = maximum demand / rated capacity

- 35. Maximum demand meter indicates
- (A) kVA rating
- (B) kW rating
- (C) kVAR rating
- (D) None of the above

#### Answer: Option (A)

### **Explanation:** The maximum demand meter is used to measure the maximum demand. It indicates the maximum demand in terms of kVA rating

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### ZEAL POLYTECHNIC