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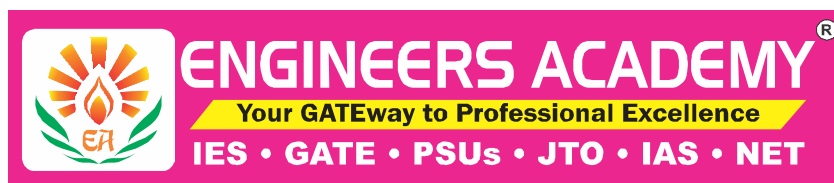
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UNIT-I

POWER SYSTEM

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CHAPTER

1

GENERATION OF ELECTRICAL POWER &
ECONOMIC CONSIDERATION

OBJECTIVE QUESTIONS

1. The secondary sources of energy are
(a) Solar, wind and water (b) Coal, oil and uranium
(c) Either (a) or (b) (d) Neither (a) or (b)
2. The draught which a chimney produces is called
(a) Induced draught (b) Natural draught
(c) Forced draught (d) Balanced draught
3. The draught in locomotive boilers is produced by
(a) Forced fan
(b) Chimney
(c) Steam jet
(d) Only motion of locomotive
4. Caking coals are those which
(a) Burn completely
(b) Burn freely
(c) Do not form ash
(d) Form lumps or masses of coke
5. Blowing down of boiler water is the process
(a) To reduce the boiler pressure
(b) To increase the steam temperature
(c) To control the solid concentration in the boiler water by removing some of the concentrated saline water
(d) None of the above
6. The blades of the gas turbine rotor are made of
(a) Carbon steel
(b) Stainless steel
(c) High alloy steel
(d) High nickel alloy (Nimic 80)
7. Fission chain reaction is possible when
(a) Fission produces the same number of neutrons which are absorbed
(b) Fission produces more neutrons than are absorbed
(c) Fission produces less neutrons than are absorbed
(d) None of the above
8. A consumer has to pay lesser fixed charges in
(a) Flat rate tariff
(b) Two part tariff
(c) Maximum demand tariff
(d) None of the above
9. In Hopkinson demand rate or two part tariff the demand rate or fixed charges are
(a) Dependent upon the energy consumed
(b) Dependent upon the maximum demand of the consumer
(c) Both (a) and (b)
(d) None of the above
10. In a load-duration curve for an integrated power system the uppermost crest represents the energy contributed by
(a) Base power station
(b) Major thermal station
(c) Peaking hydro or gas turbine stations
(d) Non-conventional power stations
11. The voltage of a single solar cell is
(a) 0.2 V (b) 0.5 V (c) 1.0 V (d) 2.0 V
12. Load curve is useful in deciding the
(a) Operating schedule of generating units
(b) Sizes of generating units
(c) Total installed capacity of the plant
(d) All of the above
13. Annual operating expenditure of a power plant consists of
(a) Fixed charges (b) Semi-fixed charges
(c) Running charges (d) All of the above
14. Direct conversion of heat into electric power is possible through
(a) Fuel cell (b) Batteries
(c) Thermionic converter (d) All of the above
15. A pilot exciter is provided on generators for which of the following reasons?
(a) To excite the poles of main exciter
(b) To provide requisite starting torque to main exciter
(c) To provide requisite starting torque to generator
(d) None of the above
16. The maximum demand of a consumer is 2 kW and his daily energy consumption is 20 units. His load factor is
(a) 10% (b) 41.6% (c) 50% (d) None
17. The economizer, a component of steam power plants, is a heat-exchanger utilising the waste heat of
(a) Bleed-steam to heat the feed water
(b) Flue-gas to heat the feed water
(c) Flue-gas to heat the air going into the boiler
(d) Flue-gas to heat the pulverised coal

18. Match List-I (Power plant) with List-II (Application) and select the correct answer using the codes given below

List-I

- A. Nuclear
B. Diesel
C. Gas turbine
D. Hydro

List-II

1. Base load
2. Stand by
3. Base load or peak load
4. Peak load

Codes: A B C D

- (a) 1 3 4 2
(b) 4 2 1 3
(c) 4 3 1 2
(d) 1 2 4 3

19. Match List-I (Pressure head) with List-II (Type of turbine) and select the correct answer using the codes given below the lists

List-I

- A. Low head
B. Medium head
C. High head

List-II

1. Kaplan
2. Francis
3. Pelton

Codes: A B C

- (a) 1 2 3
(b) 3 2 1
(c) 2 3 1
(d) 2 1 3

20. The instantaneous power taken by a balanced three-phase load supplied from a balanced three phase source is

- (a) Zero
(b) A constant value
(c) A pulsating function with a non-zero average
(d) Alternating with a zero average

21. To increase power transfer capability of a long transmission line, we should

- (a) Increase line resistance
(b) Increase transmission voltage
(c) Decrease line reactance
(d) Both (b) & (c)

[DMRC JE - 2016]

22. The moderator is used in nuclear power plant to

- (a) prevent the reactor from harmful radiation
(b) increase the speed of neutron
(c) decrease the speed of neutron
(d) coolant

[LMRC JE - 2015]

23. Lignite, bituminous and anthracite are different ranks of

- (a) Nuclear fuel (b) Coal
(c) Biogas (d) Natural gas

[TNPSC AE - 2018]

24. In a nuclear reactor, heavy water can be ideally used as

- (a) Biological shield (b) Moderator
(c) Control rods (d) All of the above

25. Value of Power factor lies in between

- (a) 0 and 1 (b) 0 and 10
(c) 10 and 100 (d) 10 and 1000

26. Which of the following is a device capable of supplying electrical energy?

- (a) Microwave (b) Radio transmitter
(c) Solar cell (d) None of these

27. Large turbo-generators are usually driven by ____.

- (a) Coal turbine (b) Steam turbine
(c) Diesel turbine (d) Water turbine

[UPPCL JE - 2014]

28. What is the maximum possible output of a solar array?

- (a) 500 W/m² (b) 250 W/m²
(c) 500 kW/m² (d) 250 mW/m²

[DSSSB JE - 2014]

29. If maximum load of generating station and the rated plant capacity are equal then

- (a) Load factor is 1
(b) Capacity factor is 1
(c) Load factor and capacity factor are equal
(d) Utilization factor is poor.

[UPPCL JE - 2014]

30. Which of the following expressions depicts the Utilization Factor?

- (a) Ratio of maximum generator demand to the generator capacity.
(b) Ratio of actual energy produced to the generator capacity.
(c) Ratio of generator capacity to maximum generation demand.
(d) Ratio of generator capacity to actual energy produced.

[UPPCL JE - 2014]

31. In a star connected balanced circuit the phase difference between the line voltage V_{RY} and the phase voltage V_{RN} is equal to

- (a) $30^\circ - \phi$ (b) 60° (c) 120° (d) 30°

[NMRC JE - 2017]

32. The following generating station has the minimum running cost

- (a) Diesel power station
(b) Nuclear power station
(c) Hydroelectric power station
(d) Thermal power station

[NMRC JE - 2017]

33. The normal phase sequence of a 3 phase AC supply is

- (a) RBY (b) RYB (c) BRY (d) YBR

[NMRC JE - 2017]

34. The ratio of average load to the maximum demand during a given period is _____.
 (a) Demand factor (b) Diversity factor
 (c) Load factor (d) Connected load
 [NMRC JE - 2017]
35. In a nuclear power station, moderator is used to
 (a) Accelerate the speed of neutrons
 (b) Stop the chain reaction
 (c) Absorb neutrons
 (d) Reduce the speed of neutrons
 [NMRC JE - 2017]
36. To a star connected 3 phase system, relationship between line voltage and phase voltage is given by
 (a) $V_L = V_{ph}$ (b) $V_L = 3V_{ph}$
 (c) $V_L = \sqrt{3} V_{ph}$ (d) $V_L = \sqrt{2} V_{ph}$
 [NMRC JE - 2017]
37. Induced draft fans are located at
 (a) The top
 (b) The bottom
 (c) In the middle part
 (d) Can be anywhere, in the cooling tower
38. The disadvantages of renewable source of energy is /are
 (a) Intermittency
 (b) Lack of dependability
 (c) Availability in low energy densities
 (d) All the above
39. Which of the following is usually not the generating voltage
 (a) 6.6 kV (b) 11 kV (c) 12.5 kV (d) 13.2 kV
40. Large size steam power plants and nuclear plants are suitable for
 (a) Base loads (b) Intermediate loads
 (c) Peak loads (d) Both base and peak loads
 [TNPSC AE - 2018]
41. Which plant can never have 100% load factor
 (a) Nuclear power plant
 (b) Peak load plant
 (c) Hydro electric power plant
 (d) Base load plant
42. More heat loss in a steam power station occurs in
 (a) Boiler (b) Super heater
 (c) Economiser (d) Condenser
43. A commercial and an ideal regulated power supply should have
 (a) 100%, 50% regulation (b) 1%, 0% regulation
 (c) 100%, 0% regulation (d) 100%, 100% regulation
44. Which of the following connections of a three phase transformer are best suited for 3-phase, 4-wire service ?
 (a) $\Delta - \Delta$ (b) $Y - Y$ (c) $\Delta - Y$ (d) $Y - \Delta$
 [UPPCL JE - 2007]
45. Kaplan turbines are used whenever the water head is
 (a) low (b) high
 (c) medium (d) both (b) and (c)
 [UPPCL JE - 2007, 2018]
46. Economisers are used to heat
 (a) Coal (b) Air (c) Steam (d) Feed water
 [UPPCL JE - 2007]
47. In thermal power plants, the pressure of working fluid cycle is developed by
 (a) Condenser (b) Superheater
 (c) Feed water pump (d) Turbine
 [UPPCL JE - 2007]
48. A gas turbine power plant is best suited for
 (a) Base load (b) Peak load
 (c) Emergency purpose (d) None of the above
 [UPPCL JE - 2007]
49. Out of the following plant categories
 (i) Nuclear
 (ii) Run-off river
 (iii) Pump storage
 (iv) Diesel
 The base load power plants are
 (a) (i) and (ii) (b) (ii) and (iii)
 (c) (i), (ii) and (iii) (d) (i), (iii) and (iv)
 [UPPCL JE - 2007]
50. Which of the following components is not a part of hydro-electric plant ?
 (a) Penstock (b) Spillway
 (c) Surge tank (d) Economiser
 [UPPCL JE - 2007]
51. The pH value of water used for boiler of thermal power plant is
 (a) Unity (b) 7
 (c) Slightly more than 7 (d) 10
 [Uttarakhand JE - 2013, UPPCL JE - 2007]
52. The expression for power plant output in kilo-watt of a hydro-electric plant is given by
 (a) $\frac{0.736 Q.W.h}{75 \times \eta_o}$ (b) $\frac{0.736 Q.W.h \cdot \eta_o}{75}$
 (c) $\frac{75 Q \cdot Wh \cdot \eta_o}{0.736}$ (d) None of these
 [Uttarakhand JE - 2013, UPPCL JE - 2007]
53. The first nuclear power plant was built in India at which place ?
 (a) Tarapur (b) Rana Pratap Sagar
 (c) Kalpakkam (d) Narora
 [UPPCL JE - 2007]

90. Binary vapour cycles are used to _____.
 (a) Increase efficiency of the turbine
 (b) Increase the efficiency of the plant
 (c) Increase the performance of the condenser
 (d) Balance the efficiency of turbine
[UPPCL JE - 2018]
91. The amount of energy available in the wind at any instant is proportional to _____ of the wind speed.
 (a) Square root (b) Square
 (c) Half (d) Cube
[TNPSC AE - 2018]
92. Puga valley in Ladakh is suitable for which of the following power generation?
 (a) Wind (b) Solar
 (c) Geo thermal (d) All of these
[UPPCL JE - 2018]
93. NASA standard value for solar constant
 (a) 1353 Watts/sq.m
 (b) 116.5 Watts/sq.m
 (c) 13.53 kw/sq.m
 (d) 0.116 kw/sq.m
[DSSSB JE - 2014]
94. A man receives an electricity bill where his monthly consumption was given as 123 units. This commercial units is basically
 (a) kWh (b) kW
 (c) Watt per hour (d) Watt per second
[UPPCL - 2016]
95. Which of these sources leave a larger carbon footprint?
 (a) Hydro (b) Solar
 (c) Thermal (d) Hydrogen
[AAI - 2016]
96. Combined cycle power plants may need
 (a) MHD generator
 (b) Thermionic converter
 (c) Thermoelectric generator
 (d) All of these
[Uttarkhand JE 2013]
97. _____ are employed for the operation of Jaw Crushers
 (a) DC shunt wound motor
 (b) Squirrel cage induction motor
 (c) Belted slip ring induction motor
 (d) Any DC motor
[UPPCL JE - 2016]
98. For a consumer, the most economical power factor is generally
 (a) 0.5 lagging (b) 0.95 lagging
 (c) 0.4 leading (d) 0.75 leading
[URPVUNL - 2015]
99. In Flat Demand Rate, the bill depends on ;
 1. Maximum Demand
 2. Amount of Energy Consumed
 Which of the following is/are correct?
 (a) Neither 1 or 2 (b) Only 1
 (c) Both 1 and 2 (d) Only 2
[UPPCL - 2016]
100. Power from
 (a) Thermal plants are preferred for normal periods and Hydro plants are preferred for peak power periods
 (b) Thermal plants are preferred for peak periods and Hydro plants are preferred for normal periods
 (c) Thermal and hydro have no utility during peak periods
 (d) Both thermal and hydro are preferred for normal periods
[UPRVUNL JE - 2016]
101. Which one of the following is a boiler fitting?
 (a) Steam separator (b) Blow-off cock
 (c) Economizer (d) Super heater
[Jharkhand JE - 2017]
102. Which plant has high depreciation charges ?
 (a) Wind power plant (b) Thermal plant
 (c) Hydroelectric plant (d) Diesel plant
[UPRVUNL - 2015, JUVNL JE - 2017]
103. The function of economiser in thermal power plant is to
 (a) Extract heat from flue gases and uses it for heating feed water to boiler
 (b) Condense the steam exhausted from turbine
 (c) Remove carbon particles from flue gases
 (d) Increase temperature of steam coming from boiler before admitting to turbine
[LMRC JE - 2016]
104. In a thermal power plant of moderate size, electrical power generated, at voltage
 (a) 110 kV (b) 230 V (c) 440 V (d) 11 kV
[UJVNL - 2016]
105. Which of the following is considered as superior quality of coal
 (a) Peat (b) Coke
 (c) Bituminous coal (d) Lignite
[UJVNL - 2016]
106. In coal-fired thermal power stations, what are the electrostatic precipitators used for?
 (a) To remove dust particles setting on the bus bar conductors in the station yard
 (b) To condense steam by electrostatic means
 (c) To keep the air heaters clean
 (d) To collect the dust particles from the flue gases
[FCI - 2015]

107. Which one of the following is used to measure temperature inside a boiler furnace?

- (a) Resistance thermometer (b) Bimetallic thermocouple
(c) Optical pyrometer (d) Thermistor

[BSNL TTA JE - 2013]

108. Which of the following in a thermal power plant, is not a fixed cost?

- (a) Fuel cost (b) Interest on capital
(c) Depreciation (d) Insurance charges

[UPRVUNL - 2015]

109. The highest rating transformer is likely to find application in

- (a) Distribution (b) Transmission
(c) Generation (d) Sub station

[JE Trainee - 2013]

110. For domestic installation the load of house is considered in which category

- (a) Inductive only (b) Resistive and inductive
(c) Resistive only (d) Resistive and capacitive

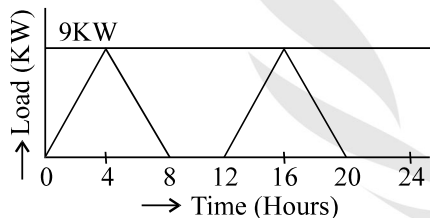
[JE Trainee - 2013]

111. The overall efficiency of a thermal power plant is equal to

- (a) Rankine cycle efficiency
(b) Carnot cycle efficiency
(c) Regenerative cycle efficiency
(d) Boiler efficiency $\times$ Turbine efficiency $\times$ Generator efficiency

[LMRC - 2015]

112. The load curve of an electric installation is shown in figure



Daily energy consumption is

- (a) 36 kwh (b) 72 kwh (c) Zero (d) 108 kwh

[JE Trainee - 2013]

113. Compounding of steam is done for

- (a) reducing the work done
(b) increasing the rotor speed
(c) reducing the rotor speed
(d) balancing the turbine

[LMRC - 2015]

114. Major share of power generated in India is through

- (a) Thermal Power Plants
(b) Nuclear Power Plants
(c) Hydro-electric Power Plants
(d) Solar energy

[Uttarkhand JE - 2013]

115. The advantage of using pulverized fuel is

- (a) Higher boiler efficiency
(b) Easy and complete combustion
(c) Low air requirement
(d) All of the above

[Uttarkhand JE - 2013]

116. In a thermal power plant, feed water heaters, super heaters and air preheaters are mainly used to

- (a) Have a better dust removal in the plant
(b) Have a better ash removal in the plant
(c) Increase the efficiency of the plant
(d) None of the above

[UPSSSC - 2015]

117. Through which source is maximum electricity generated in the world?

- (a) Water (b) Nuclear power
(c) Coal (d) Solar power

[UPSSSC - 2015]

118. Coal used in power plant is also known as

- (a) Steam coal (b) Charcoal
(c) Coke (d) Soft coal

[UPSSSC - 2015]

119. The cost of fuel transportation is minimum in

- (a) Steam power plant (b) Diesel power plant
(c) Hydro-electric plant (d) Coal based power plant

[Uttarkhand JE - 2013]

120. Solar cell is a _____

- (a) Photo voltaic cell (b) Photo radiative device
(c) Photo conductive device (d) Photo emissive device

[UPRVUNL - 2015]

121. Electrostatic Precipitators are used for following

- (a) Particulate emission control
(b) Water pollution control
(c) Noise pollution control
(d) Energy pollution control

[RRB Guwahati - 2014]

122. For the proper combustion of fuel in a thermal power plant, a proper circulation of air is also needed. The same is provided with the help of

- (a) Draft fan (b) Economiser
(c) Condenser (d) Cooling Tower

[UPPCL - 2016]

123. What is separated with the help of magnetic separators in a coal preparation plant?

- (a) Pebbles (b) Iron particles
(c) Dust (d) Sand

[UPPCL - 2016]

124. A condenser in a thermal power plant condenses steam coming out of
(a) Boiler (b) Turbine
(c) Economiser (d) Super heater
[LMRC SC/TO - 2015]
125. Which is not fundamental element of cogeneration plant?
(a) Prime mover
(b) Electricity generator
(c) Heat recovery system
(d) Power factor improvement system
[MP JE - 2015, 2016]
126. Select the INCORRECT statement regarding Thermal Power Stations?
(a) Condenser converts steam into feed water
(b) Economizer is run by super heated steam and generates mechanical power
(c) Combustion takes place in boiler
(d) Steam is converted into super heated steam in super heater
[UPPCL AE - 2016]
127. In a super-heater of steam plant the
(a) Pressure rises and temperature drops
(b) Temperature rises and pressure drops
(c) Temperature rises and pressure remains unchanged
(d) Pressure rises and temperature remains unchanged
[LMRC SC/TO - 2015, UPRVUNL AE - 2016]
128. What should be the direction for fan to produced Induced draught in right direction
(a) In any direction
(b) Below the furnace
(c) Upper part of chimney
(d) Lower part of chimney
[LMRC SC/TO - 2015]
129. The efficiency of thermal power plant increases by
(a) Burning coal in excess
(b) Excessive use of water
(c) Decreasing the load on the plant
(d) Use of high pressured steam
[UPPCL JE - 2016]
130. Boiler is a component of thermal power plants in which
(a) Coal is not combusted
(b) Water is converted into high pressured vapours
(c) Air is preheated
(d) Gases are cooled
[UPPCL JE - 2016]
131. In power systems the governors are generally used as an essential part of all types of turbines to control the
(a) Voltage phase angle (b) Reactive power output
(c) Frequency (d) Voltage magnitude
[UPRVUNL JE - 2016, Coal India Ltd. - 2017]
132. The hydro generators (HG) and steam turbines (ST) run at _____ respectively
(a) High speeds and low speeds
(b) Both have high speeds
(c) Low speeds and high speeds
(d) Both have low speeds
[UPRVUNL JE - 2016]
133. Spillways are constructed for
(a) Solar energy plants (b) Gas based plants
(c) Hydro plants (d) Thermal plants
[UPRVUNL JE - 2016]
134. Which of the following is used for cooling in large alternators
(a) Fan (b) Air conditioner
(c) Cooler (d) Air ducts
[UPRVUNL - 2015]
135. The supply frequency of AC is _____ in India
(a) 60 Hz (b) 40 Hz (c) 50 Hz (d) 45 Hz
[UPRVUNL - 2015]
136. Pumped storage plants are used for
(a) Peak load plant (b) Peak and base load plant
(c) Cogeneration plant (d) Base load plant
[LMRC JE - 2016]
137. Kaplan turbine is
(a) Inward flow, impulse turbine
(b) Out ward flow, reaction turbine
(c) A high head, plant mixed flow turbine
(d) Low head, axial flow turbine
[UPPCL - 2016, UJVNL - 2016]
138. Steam turbines converts the steam energy into
(a) Mechanical energy
(b) Electrical energy
(c) Chemical energy
(d) Nuclear energy
139. Which of the following controls the speed of turbine
(a) Alternator (b) Valve house
(c) Power house (d) Speed governor
140. Which of following power plant effects the least environment pollution
(a) Diesel generating station
(b) Hydro electric power station
(c) Thermal power plant
(d) Nuclear power plant
[UPPCL - 2015]
141. The annual depreciation of a hydro power plant is about
(a) 0.5-1.5% (b) 5-10% (c) 10-20% (d) 25-30%
[UPRVUNL - 2015]

142. Francis and Kaplan turbines fall under the category of

- (a) Impulse turbine
- (b) Reaction turbine
- (c) Axial flow
- (d) Impulse and reaction combined

[LMRC - 2015]

143. For the same power output, operating charges are minimum in a

- (a) Gas turbine plant
- (b) Hydro power plant
- (c) Thermal plant
- (d) Nuclear plant

[LMRC - 2015]

144. The coolant used in NPP

1. High thermal conductivity
2. Should be corrosion less
3. Make oxides when contact with moisture

Which of the following statement is wrong

- (a) only 3
- (b) only 2 and 3
- (c) only 1
- (d) only 1 and 3

[UPPCL - 2016]

145. The flow duration curve at a given head of a hydroelectric plant is used to determine :

- (a) Diversity factor of the plant
- (b) Total power at the site
- (c) Total energy available
- (d) Load factor of the plant

[LMRC SC/TO - 2015]

146. In hydro power station which components is used to step up the generating voltage to a suitable transmission voltage?

- (a) Transformer
- (b) Generator
- (c) Transmission line
- (d) Turbine

[MP JE - 2016]

147. Which of the turbine is used for low head, high flow rate

- (a) Pelton wheel
- (b) Francis turbine
- (c) Kaplan turbine
- (d) All of these

[RRB Ahmedabad - 2014]

148. Which of the following is used as water storage

- (a) Penstock
- (b) Surge tank
- (c) Tailrace
- (d) Reservoir

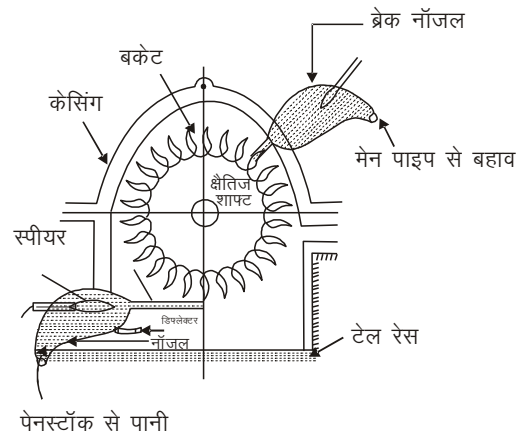
[UPPCL - 2016]

149. The generator which gives dc supply to the rotor is called

- (a) Converter
- (b) Exciter
- (c) Inverter
- (d) Rectifier

[DMRC JE - 2014]

150. Which turbine is depicted by the given picture?



- (a) Francis
- (b) Curtis
- (c) Kaplan
- (d) Pelton Wheel

[UPPCL - 2016]

151. The maximum demand of a consumer is 2 kW and the corresponding daily energy consumption is 30 units. The load factor is _____

- (a) 5%
- (b) 50%
- (c) 62.5%
- (d) 75%

[UPRVUNL AE - 2016]

152. Sluice gates and automated isolating valves are components of

- (a) Valve House
- (b) Head race
- (c) Spill Way
- (d) Penstock

[UPPCL - 2016]

153. Among the following which is/are the base load power station/plant?

1. Hydroelectric
2. Biogas
3. Diesel
4. Pumped storage

- (a) Only 1, 2, 3
- (b) Only 4
- (c) Only 4, 3
- (d) Only 1, 2

[UPRVUNL AE - 2014]

154. Which of the following pair is NOT correctly matched?

- (a) Impulse turbine-Pelton wheel turbine
- (b) Impulse turbine-Propeller turbine
- (c) Reaction turbine-Kaplan turbine
- (d) Reaction turbine-Francis turbine

[UPPCL AE - 2016]

155. With reference to hydropower station, the graphical representation of water discharge and time is known as

- (a) Hydrograph
- (b) Hectograph
- (c) Load duration curve
- (d) Load curve

[UPRVUNL AE - 2016]

156. The part of hydel power plant which takes water from valve house to turbine is ____
(a) Penstock (b) Forebay (c) Tail race (d) Spill way
[UPPCL JE - 2016]
157. Francis turbine is a/an ____
(a) Reaction turbine
(b) Impulse turbine
(c) Friction turbine
(d) Friction and Impulse turbine both
[UPPCL JE - 2016]
158. In a medium or high-head hydroelectric power station, a surge tank is provided to
(a) Reduce the length of the penstock pipes
(b) Augment water at the forebay
(c) Control the pressure variation in the penstock pipes due to sudden load changes
(d) Control the water flow through the turbines
[UPPCL AE - 2015, JE - 2016]
159. Maximum demand tariff is not applied to domestic consumers due to low
(a) Maximum demand (b) Energy consumption
(c) Power factor (d) Load factor
[LMRC SC/TO - 2015]
160. Form factor is the ratio of
(a) Maximum value to r.m.s value
(b) Maximum value to average value
(c) r.m.s value to average value
(d) r.m.s value to instantaneous value
[DMRC - 2016]
161. The product of demand factor and load factor is
(a) Average load/maximum demand
(b) Connected load/average load
(c) Connected load/maximum demand
(d) Average load/ connected load
[UPPCL - 2016]
162. In a nuclear power station using boiling water reactor (BWR), water used as
(a) Moderator but not as a coolant
(b) Coolant but not as a moderator
(c) Both moderator and coolant
(d) Neither moderator nor coolant
[UPRVUNLAE - 2016]
163. Which of the following material is used as moderator?
(a) Graphite
(b) Boron
(c) Sodium potassium liquid
(d) Plutonium
[UJVNL - 2016]
164. Which of the following power plants involves high initial cost in erecting?
(a) Hydroelectric power plant
(b) Steam power plant
(c) Gas turbine power plant
(d) Nuclear power plant
[J&K JE - 2016, UPRVUNL - 2016]
165. Which of the following is not used as coolant in nuclear power plant
(a) Sodium (b) Lithium
(c) Helium (d) Magnesium
[UPPCL - 2015]
166. Which of the following is used as moderator in nuclear power plants?
(a) Sodium (b) Graphite
(c) Heavy water (d) Hydrogen
[LMRC - 2015]
167. Which of the following will produce the largest amount of energy?
(a) Burning of 1 kg petrol
(b) Burning of 1 kg anthracite
(c) Burning of 10 kg wood
(d) Nuclear fission of 1 kg uranium
[UPPCL - 2016]
168. Kalpakkam, Tarapur and Kota are famous for
(a) Hydro Power Plants (b) Nuclear Power Plants
(c) Thermal Power Plants (d) Diesel Power Plants
[UPPCL - 2016]
169. Which of the following is not used as fuel in nuclear power plants
(a) U-238 (b) U-235 (c) Pu-239 (d) Th-232
[UPPCL - 2016]
170. Which one is not a commonly used as coolant for fast breeder reactor?
(a) Water (b) Liquid metal
(c) Helium (d) Carbon dioxide
[Uttarkhand JE - 2013]
171. Which of the following plant is suitable for peak load?
(a) Diesel engine plant
(b) Steam power plant
(c) Nuclear power plant
(d) Hydro-electric plant
[Jammu & Kashmir JE 2016, UPRVUNL - 2016]
172. A diesel power station spends 0.25 kg/kWh fuel. If the calorific value is 10,000 kcal/kg then overall efficiency of the power station will be
(a) 25% (b) 30% (c) 34.4% (d) 100%
[Uttarkhand JE - 2013]

173. Which of the following is not part of diesel engine power plant?
(a) Cooling tower (b) Penstock
(c) Oil pump (d) Strainer
[UPSSSC 2016, 2015]
174. Which of them is peak load station?
(a) Small capacity thermal plants
(b) Diesel stations
(c) Run of river plant
(d) All of them
[UPSSSC - 2015]
175. In a nuclear reactor, chain reaction is controlled by
(a) Graphite rods (b) Cadmium rods
(c) Brass rods (d) Iron rods
[LMRC SC/TO - 2015, UPPCL AE - 2015]
176. An electrical appliance is rated as 220 V, 5 kW, AC Here, the value 220 V refers to
(a) maximum value (b) rms value
(c) average value (d) lowest value
[UPPCL - 2016]
177. Capital cost of a gas turbine plant is _____ than that of a steam power plant of same capacity
(a) Same (b) Less (c) More (d) Irrelevant
[UPRVUNL - 2015]
178. Compressor used in gas turbines is
(a) Reciprocating compressor
(b) Plunger type compressor
(c) Screw compressor
(d) Multistage axial flow compressor
[UPSSSC - 2015]
179. Which is the negative grid voltage for a given plate potential at which ionization of the gas starts?
(a) Grid baffles (b) Control grid
(c) Thyatron (d) Critical grid voltage
[MP JE - 2016]
180. If 'a' denotes rate per kW of maximum demand, 'b' is energy rate per kWh and 'y' is the energy consumed in kWh, then the total bill given by the expression 'a+by' will be
(a) Straight meter Rate (b) Three part Tariff
(c) Flat demand Rate (d) Two part Tariff
[UPPCL - 2016]
181. A generating station has a connected load of 500 MW and a maximum demand of 250 MW. The units generated being 10000 per week. Calculate the average demand
(a) 150 kW (b) 297.6 kW
(c) 29.8 kW (d) 59.52 kW
[UPRVUNL JE - 2016]
182. Load factor for a system or a plant is defined as _____ for a certain period of time
(a) Product of the peak load and the average load
(b) Ratio of the connected load to the average
(c) Ratio of the peak load to the average load
(d) Ratio of the average load to the peak load
[UPRVUNL JE - 2016, Jharkhand JE - 2017]
183. A generating station has a connected load of 500 MW and a maximum demand of 250 MW. The units generated being 10000 per week. Calculate the demand factor.
(a) 2 (b) 40 (c) 20 (d) 0.5
[UPRVUNL JE - 2016, Jharkhand JE - 2017]
184. In a power plant decrement in utilization factor means the power plant will
(a) Work as base as well as peak load
(b) Used when necessary
(c) When maintenance is in process
(d) Use for base load only
[Jharkhand JE - 2017]
185. Which of the following factor is decided by diversity factor
(a) Plant capacity (b) Average load
(c) Peak load (d) kWh generated
[Jharkhand JE - 2017]
186. The area under a load curve gives
(a) Average demand (b) Energy consumed
(c) Maximum demand (d) Minimum demand
[MPPKVCL - 2017]
187. The ratio of average load to the maximum load during a given period is _____
(a) Demand factor (b) Diversity factor
(c) Load factor (d) Connected load
[NMRC - 2017]
188. In a generating station, fixed charges at 100% load factor is 6 paise/kWh. With 25% load factor, the charges in paise/kWh would be
(a) 1.5 (b) 10 (c) 24 (d) 3
[MPPKVCL - 2017]
189. In the context of interconnected systems, which statement is NOT correct?
(a) Reduces the installed capacity
(b) Increase the cost of generation
(c) Decreases spinning reserve capacity
(d) Increase the service reliability
[LMRC JE - 2016]
190. The efficiency of Savonius Wind mill is about
(a) 5% (b) 15% (c) 25% (d) 35%
[UPPCL JE - 2016]
191. In a bio-gas plant, pH of the slurry is kept between
(a) 4.5-5.5 (b) 5.5-6.5 (c) 6.5-8.5 (d) 8.5-10.5
[UPPCL JE - 2016]

192. Which of the following is not a type of Horizontal Axis Wind mill?

- (a) Multi Blade (b) Sail
(c) Propellar (d) Darius

[UPPCL JE - 2016]

193. In context to solar energy production, the efficiency of flat plate collectors is usually

- (a) 20 - 30% (b) 30 - 50%
(c) 50 - 70% (d) 70 - 90%

[UPPCL JE - 2016]

194. _____ gas in majority produced by an areboic decomposition of human or animal excreta

- (a) Methane (b) Carbon di oxide
(c) Nitrogen di oxide (d) Ammonia

[UPPCL JE - 2016]

195. Biogas comprises mainly of

- (a) 60% oxygen and 40% carbon dioxide
(b) 60% oxygen and 40% methane
(c) 60% methane and 40% oxygen
(d) 60% methane and rest carbon dioxide

[Uttarkhand JE - 2013]

196. The possible site for Geothermal energy extraction for the purpose of electricity in India is

- (a) Madhya Pradesh (b) Kerala
(c) Tamil Nadu (d) Assam

[Uttarkhand JE - 2013]

197. Minimum wind speed required for generating electricity in a wind mill is

- (a) 15 m/hour (b) 1 km/hour
(c) 15 km/hour (d) None of the above

[Uttarkhand JE - 2013]

198. Non-Conventional methods of power generation is/are

- (a) Solar power generation (b) Thermionic converters
(c) Both of the above (d) None of the above

[MP JE - 2016]

199. Match the following

- | | |
|---|---|
| 1. Load curve | a. Everlasting |
| 2. Tidal power generation | b. Variation of load on the reference to time |
| 3. Non-conventional methods of power generation | c. Photo voltaic effect |
| 4. Solar cell | d. Fuel cells generation |
| (a) 1-b 2-a, 3-d, 4-c | (b) 1-a 2-b, 3-c, 4-d |
| (c) 1-c, 2-d, 3-b, 4-a | (d) 1-a, 2-d, 3-c, 4-b |

[MP JE - 2016]

200. Which of the following statements is false?

- (a) The amount of Tidal energy is independent of range of tides
(b) Biogas contains approximately 70% of methane
(c) The manure we get from biogas plant easily mixes with the soil
(d) Solar energy can be employed for running water pumps

[UPPCL - 2016]

201. A Geothermal field produces

1. Hot water
2. Wet steam
3. Dry steam

The correct amongst the given is-

- (a) 1 and 2 (b) 1 and 3
(c) 1, 2 and 3 (d) None of these

[UPPCL - 2016]

202. Horizontal axis and vertical axis are the types of

- (a) Nuclear Reactor (b) Wind Mills
(c) Bio Gas Reactor (d) Solar Cell

[Uttarkhand JE - 2013]

203. Which of the following statement is incorrect?

- (a) Uranium is a radioactive material
(b) Anthracite is the best form of coal
(c) Solar energy is pollution free
(d) Wind energy is a conventional source of energy

[UPPCL - 2016]

204. Which of the following pair is not correctly matched?

- (a) Mass-kg (b) Current-A
(c) Temperature -°C (d) Luminous Intensity-cd

[UPPCL JE - 2016]

205. Global warming is mainly due to

- (a) Emission of heat from engines
(b) Emission of CO₂ due to burning of fossil fuels
(c) Use of nuclear energy
(d) Air pollution

[Uttarkhand JE - 2013]

[MP JE - 2015]

206. If the sum of individual maximum demands is 2.694 kW and the maximum demand at any time is 0.9 kW. What is the diversity factor in power system?

- (a) 2.99 (b) 5 (c) 10 (d) 15

[MPPKVCL - 2017]

207. Domestic consumer load is around

- (a) 5 kW (b) 40 kW (c) 80 kW (d) 120 kW

[MPPKVCL - 2017]

208. What is the usually load factor range for domestic load?

- (a) 10% to 15% (b) 30% to 40%
(c) 50% to 60% (d) 60% to 70%

[MPPKVCL - 2017]

209. In an electrical installation, the maximum demand is given by its
(a) instantaneous maximum demand
(b) greatest average power demand
(c) average maximum demand over a definite interval of time during a certain period
(d) average power demand during an interval of one minute
[MPPKVCL – 2017]
210. What is resultant of the area under daily load curve divided by 24 hours?
(a) least load (b) total kWh generated
(c) peak demand (d) average load
[JUVNL JE – 2017]
211. The rates for consumption of 250 kWh at block rate tariff is quoted as,
1. first 20 kWh at 60 paise/kWh
2. next 25 kWh at 50 paise/kWh
3. first 35 kWh at 40 paise/kWh
4. exceeding 80 kWh at 30 paise/unit
The average cost per unit of consumption is
(a) 33.4 paise/kWh (b) 89.4 paise/kWh
(c) 35.8 paise/kWh (d) 53.8 paise/kWh
[DMRC JE – 2017]
212. A load consumes 600 kWh per day at a load factor of 0.45. What will be the maximum demand in kW?
(a) 40 kW (b) 60 kW
(c) 55.55 kW (d) 50 kW
[LMRC JE – 2016]
213. The yearly load duration curve of a power plant is a straight line. The average annual load is 400 MW. The capacity of the plant is 900 MW. The plant capacity factor will be
(a) 0.6 (b) 0.5 (c) 0.3 (d) 0.4
[LMRC JE – 2016]
214. A large diversity factor means
(a) Increases the maximum demand
(b) Increased the unit price of electricity
(c) Reduce the unit price of electricity
(d) Large plant capacity is required
[LMRC JE – 2016]
215. What is the most effective way to reduce the cost of power generation in a power station?
(a) By increasing the diversity factor and decreasing the load factor
(b) By increasing both the diversity factor and the load factor
(c) By decreasing both the diversity factor and the load factor
(d) By decreasing the diversity factor and increasing the load factor
[Jammu & Kashmir JE – 2016]
216. In a generating station connected load is 50×10^3 KW and maximum demand is 20×10^6 W and annual energy generated is 60×10^6 unit then what is demand factor of plant.
(a) 53% (b) 40% (c) 83% (d) 33%
[UPPCL – 2013]
217. Electric generating plant are inter connected to
(a) Ensure reliability of supply
(b) Maintain constancy of frequency
(c) Improve voltage regulation
(d) To increase transmission efficiency
[UPPCL – 2013]
218. During the calculation of electric work expenses contingency expenses & material & labour cost are expected in percentage are respectively
(a) 1% (b) 15% to 10%
(c) 50% to 60% (d) 60% to 70%
[UPRVUNL – 2015]
219. Load shedding is done to
(a) Improve power factor
(b) Run the equipment efficiently
(c) Repair the machine
(d) Reduce peak demand
[UPRVUNL – 2015]
220. Which of the following expressions depicts the Utilization Factor?
(a) Ratio of maximum generator demand to the generator capacity
(b) Ratio of actual energy produced to the generator capacity
(c) Ratio of generator capacity to maximum generation demand
(d) Ratio of generator capacity to actual energy produced
[UPRVUNL – 2014]
221. Demand Factor is defined as
(a) Maximum load/average load
(b) Average load/Maximum load
(c) Maximum load/ total connected load
(d) Total connected load/Maximum load
[LMRC 2015, DMRC – 2015]
222. The ratio of energy produced in a given time to the maximum possible energy that can be produced is
(a) Utilization factor (b) Plant use factor
(c) Demand factor (d) Load factor
[LMRC – 2015]
223. Direct conversion of heat electrical energy is done by
(a) Fuel cells (b) Stem cells
(c) Solar cells (d) MHD generators
[LMRC – 2015]

259. The daily load factor is calculated as

- (a) $\frac{\text{No. of units consumed per day}}{\text{Max. demand of the day}}$
 (b) $\frac{\text{No. of units consumed per day}}{24 \times \text{Max. demand of the day}}$
 (c) $\frac{24 \times \text{Max. demand of the day}}{\text{No. of units consumed per day}}$
 (d) $\frac{\text{Max. demand of the day}}{\text{No. of units consumed per day}}$

260. The maintenance cost for the electrical equipment is called

- (a) Depreciation cost (b) Investment cost
 (c) Auxiliary cost (d) Operating cost

261. The surge tanks are usually provided in high or medium head _____ power plants when considerably _____ is required.

- (a) Hydro-electric, short penstock
 (b) Hydro-electric, long penstock
 (c) Thermal, short penstock
 (d) Thermal, large steam turbine

262. The generation of power in a power plant has to be controlled to meet the

- (a) Demand of load and power factor
 (b) Demand of load only
 (c) Demand of load and frequency
 (d) Frequency and power factor

263. The overall efficiency of a steam power station is computed as

- (a) $\frac{\text{Steam energy}}{\text{Heat of combustion of coal}}$
 (b) $\frac{\text{Heat equivalent of electrical output}}{\text{Heat of combustion of coal}}$
 (c) $\frac{\text{Heat equivalent of mech. energy transmitted to turbine shaft}}{\text{Heat of coal combustion}}$
 (d) $\frac{\text{Heat of combustion coal}}{\text{Mech. energy}}$

264. The factors influencing costs and tariffs of electric supply are

- (a) (i) Standing charges that are independent of the output and
 (ii) running or operating charges that are proportional to the output
 (b) (i) Standing charges that are proportional to the output and
 (ii) running or operating charges that are independent of the output

- (c) (i) Standing charges that are proportional to the output and
 (ii) running or operating charges that are proportional to the output
 (d) (i) Standing charges that are independent of the output and
 (ii) running or operating charges that are independent of the output

265. Tariff is defined as the rate at which _____ is supplied to a consumer.

- (a) Power (b) Current (c) Energy (d) Voltage

[PGCIL - 2018]

266. Which of the following generating power stations requires lot of time for starting?

- (a) Steam power station
 (b) Diesel power plant
 (c) Hydro-electric power plant
 (d) Nuclear power plant

[PGCIL - 2018]

267. When the rate of electrical energy is charged on the basis of maximum demand of the consumer and the units consumed it is called

- (a) Simple tariff (b) Block rate tariff
 (c) Two-part tariff (d) Flat rate tariff

[PGCIL - 2018]

268. Two-part tariff is based on

- (a) A fixed charge proportional to the maximum demand
 (b) Sliding scale
 (c) Fixed charge on the actual number of units used
 (d) Fixed charge proportional to the maximum demand and a low running charge proportional to the actual numbers of units used

[PGCIL - 2018]

269. The maximum demand of a consumer is 4.4 kW and his total energy consumption is 8760 kWh if the energy is charged at the rate of 20 paise per unit for 500 hours use of the maximum demand per annum plus 10 paise per unit for additional units, calculate the annual bill

- (a) ₹ 10060 (b) ₹ 1000 (c) ₹ 96 (d) ₹ 1096

[PGCIL - 2018]

270. When a given block of energy is charged at a specified rate and the succeeding blocks of energy are charged at progressively reduced rates it is called

- (a) Maximum demand tariff
 (b) Two-part tariff
 (c) Power factor tariff
 (d) Block rate tariff

[PGCIL - 2018]

306. The load on the power plant w.r.t time for 24 Hr are given as

Time (Hr)	Load (MW)
0 - 6	40
6 - 8	50
8 - 12	60
12 - 14	50
14 - 18	70
18 - 22	80
22 - 24	40

The load factor of power station is as

- (a) 0.75 (b) 0.71 (c) 0.60 (d) 0.68

[TGENCO-2015]

307. Power station having Load factor = 70%, capacity factor = 50%, used factor = 60% maximum demand = 20 MW then annual energy production is

- (a) 122.8 GWh (b) 198.55 GWh
(c) 128.2 GWh (d) 188.82 GWh

[TGENCO-2015]

308. Reflector mirrors employed for exploiting solar energy are called the

- (a) Mantle (b) Heliostats
(c) Diffusers (d) Ponds

[TSTRANSCO-2015]

309. The capital cost of power plant depends on

- (a) Total installed capacity only
(b) Total number of units only
(c) Total installed capacity and number of units as well
(d) Neither the installed capacity nor number of units.

[TSTRANSCO-2015]

310. The load duration curve for unity load factor will be of

- (a) Rectangular shape
(b) Triangular shape
(c) L-shape
(d) I-shape

[TSTRANSCO-2015]

311. The unit heat rate characteristic of a thermal power unit shows

- (a) Heat input per kWh of output versus the megawatt output of unit
(b) Heat input per kW of output versus the megawatt output of unit
(c) Heat input per kWh of output versus the megawatt hour output of unit
(d) Heat input per kW of output versus the megawatt hour output of unit

[TSSPDCL-2015]

312. If 'D' is diameter of circular area 'A' swept by rotor and 'V' is wind speed, the wind power is proportional to

- (a) AV^2 (b) A^2V^3 (c) D^2V^3 (d) DV

[TSSPDCL-2015]

313. A Pyrheliometer is an instrument to measure

- (a) Temperature of solar photovoltaic cell
(b) Intensity of direct solar radiation at normal incidence
(c) Intensity of indirect solar radiation
(d) Efficiency of a solar photovoltaic cell

[TSNPDCL-2015]

314. The main function of economiser of a boiler plant is to

- (a) Increase steam production
(b) Reduce fuel consumption
(c) Increase steam pressure
(d) Increase life of the boiler

[HMWS-2015]

315. The load of a consumer is generally measured in terms of

- (a) Volts (b) Amperes
(c) Ampere hour (d) KW

[UPPCL-JE-2015]

316. One 1000 watt Heater works daily 4 hours. What will be its bill for 30 days @ ₹ 35 Paise per unit of electricity.

- (a) ₹ 200 (b) ₹ 300 (c) ₹ 275 (d) ₹ 42.00

[UPPCL-JE-2014]

317. Load factor of a power station is generally _____.

- (a) Zero (b) More than unity
(c) Less than unity (d) Unity

ANSWERS SHEET

1. *Ans. (a)*
2. *Ans. (b)*
3. *Ans. (c)*
4. *Ans. (d)*
5. *Ans. (c)*
6. *Ans. (d)*
7. *Ans. (b)*
8. *Ans. (c)*
9. *Ans. (b)*
10. *Ans. (c)*
11. *Ans. (b)*
12. *Ans. (d)*
13. *Ans. (d)*
14. *Ans. (c)*
15. *Ans. (a)*
16. *Ans. (b)*

$$\text{Load Factor} = \frac{\text{Average Load}}{\text{Peak Load}} \times 100$$

$$= \frac{20}{2 \times 24} \times 100 = 41.6\%$$

17. *Ans. (b)*
18. *Ans. (d)*
19. *Ans. (a)*
20. *Ans. (b)*
21. *Ans. (d)*
22. *Ans. (c)*
23. *Ans. (b)*
24. *Ans. (b)*
25. *Ans. (a)*
26. *Ans. (c)*
27. *Ans. (b)*
28. *Ans. (b)*
29. *Ans. (c)*
30. *Ans. (a)*
31. *Ans. (d)*
32. *Ans. (c)*
33. *Ans. (b)*
34. *Ans. (c)*
35. *Ans. (d)*
36. *Ans. (c)*
37. *Ans. (a)*
38. *Ans. (d)*
39. *Ans. (c)*
40. *Ans. (a)*

41. *Ans. (b)*
42. *Ans. (d)*
43. *Ans. (b)*
44. *Ans. (c)*
45. *Ans. (a)*
46. *Ans. (d)*
47. *Ans. (c)*
48. *Ans. (b)*
49. *Ans. (a)*
50. *Ans. (d)*
51. *Ans. (c)*
52. *Ans. (b)*
53. *Ans. (a)*
54. *Ans. (c)*
55. *Ans. (b)*

$$\text{Demand Factor} = \frac{\text{Maximum Demand}}{\text{Connected Load}}$$

$$= \frac{1.5}{2} = 0.75$$

56. *Ans. (d)*
57. *Ans. (a)*
58. *Ans. (b)*
59. *Ans. (d)*
60. *Ans. (d)*
61. *Ans. (a)*
62. *Ans. (b)*
63. *Ans. (d)*
64. *Ans. (b)*
65. *Ans. (b)*
66. *Ans. (a)*
67. *Ans. (c)*
68. *Ans. (b)*
69. *Ans. (d)*
70. *Ans. (d)*

Potential energy of large quantity of stored water is used by hydro electric 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.

71. *Ans. (c)*
72. *Ans. (a)*

Penstocks are pipes or long channels that carry water down from the hydroelectric reservoir to the turbines inside the actual power stations.

257. *Ans. (a)*

Load factor

$$\therefore \text{LF} = \frac{\text{Average load}}{\text{Peak load}}$$

 $\Rightarrow$ Average load

$$= 0.6 \times 100 = 60 \text{ MW}$$

 $\therefore$ Energy produced

$$\begin{aligned} &= \text{Average load} \times \text{Time} \\ &= 60 \times 30 \times 24 \times 10^3 \\ &= 432 \times 10^5 \text{ KWh} \\ &= 432 \times 10^5 \text{ units} \end{aligned}$$

258. *Ans. (d)*259. *Ans. (b)*260. *Ans. (d)*261. *Ans. (b)*262. *Ans. (c)*263. *Ans. (b)*264. *Ans. (a)*265. *Ans. (c)*266. *Ans. (a)*267. *Ans. (c)*268. *Ans. (d)*269. *Ans. (d)*

$$\begin{aligned} &\text{MD} \times 500 \times 0.20 + \text{Remaining unit} \times ₹ 0.10 \\ &= 4.4 \times 500 \times 0.20 + \{8760 - (4.4 \times 500)\} \times 0.10 \\ &= 440 + 656 = ₹ 1096 \end{aligned}$$

270. *Ans. (d)*271. *Ans. (b)*272. *Ans. (a)* $\therefore$ Overall efficiency

$$= \frac{\text{Electrical output (in kwh)}}{\text{Heat of combustion}}$$

$$\Rightarrow 0.2 = \frac{860 \text{ kcal}}{x \times 0.5}$$

$$\Rightarrow x = 8600 \text{ kcal/kg.}$$

273. *Ans. (c)*

Whole of the ash from the furnace should get deposited in the bunkers.

274. *Ans. (c)*275. *Ans. (c)*

In order to control the nuclear reaction according to loading condition, the control rods are employed. The control rods will absorb the neutrons in order to reduce the nuclear reaction.

The materials which can be used for control rods are Boron & Cadmium.

276. *Ans. (c)*(i) **Kaplan or movable vane propeller** $\rightarrow 2 < H < 15 \text{ m}$ (for variable load operation)(ii) **Fixed vane propeller** $\rightarrow 15 < H < 70 \text{ m}$

(fairly constant load operation)

(iii) **Francis:** $70 \text{ m} < H < 500 \text{ m}$ (iv) **Pelton wheel:** $H > 500 \text{ m}$ 277. *Ans. (c)*278. *Ans. (b)*279. *Ans. (b)*280. *Ans. (d)*

Cladding material is magnesium.

281. *Ans. (d)*282. *Ans. (a)*

Hydro turbines are more efficient at low speed, for low speed operations salient pole rotor is used.

283. *Ans. (a)*284. *Ans. (b)*285. *Ans. (b)*286. *Ans. (c)*287. *Ans. (d)*

In hydroelectric plant the capital investment per kW is much higher plant in order to store water at sufficient head, to construct a dam. However, the running cost (or) operating cost is much less as no fuel is used.

288. *Ans. (d)*

The sudden change of pressure above the normal is known as water hammer. When the load on the system decreases, the turbine gates close partly this increases the water level in the surge tank, and velocity of water decreases. And when the load on the system increases, governor opens the turbine gates, this additional water is supplied by the surge tank and accelerating head is produced. The surge tank thus helps in stabilizing velocity and pressure in penstock and reduces the water hammer effect.

289. *Ans. (d)*290. *Ans. (b)*291. *Ans. (a)*292. *Ans. (a)*293. *Ans. (c)*294. *Ans. (a)*295. *Ans. (c)*296. *Ans. (c)*297. *Ans. (c)*

For breaker reader

Conversion ratio > 1

298. *Ans. (d)*

Higher the head lower is the discharge of water. As pelton wheel has highest operating head therefore, it will also have lowest discharge of water hence more efficient condition is high pressure and low flow.

299. *Ans. (c)*

Wind mill used as a turbine.

300. *Ans. (c)*

Coal tar is not a solid fuel. and coal peat, wood etc is solid fuel.

301. *Ans. (b)*

Steam is released to turbines, the turbines produces mechanical energy.

302. *Ans. (c)*303. *Ans. (b)*

Maximum load $P_{\max} = 15 \text{ MW}$

Load factor $L_f = 0.5$

Plant capacity factor $P_{cf} = 0.4$

Reserve capacity

$$R_c = \frac{P_{\max} [L_f - P_{cf}]}{P_{cf}}$$

$$= \frac{15(0.5 - 0.4)}{0.4} = 3.75 \text{ MW}$$

304. *Ans. (b)*

$$\text{Average load} = \frac{1500 \times 12 + 1000 \times 12}{24 \times 1500}$$

Load factor

$$L_f = \frac{1250}{1500} = 0.8333$$

305. *Ans. (b)*306. *Ans. (b)*

$$L_f = \frac{\text{Total energy consumption / day}}{\text{Maximum demand} \times 8760}$$

$$= \frac{6 \times 40 + 2 \times 50 + 4 \times 60 + 2 \times 50 + 4 \times 70 + 4 \times 80 + 2 \times 40}{80 \times 24}$$

$$= 0.71$$

307. *Ans. (a)*

$$L_f = \frac{\text{Total annual energy generation}}{\text{Maximum demand} \times 8760}$$

Annual energy production

$$= L_f \times \text{maximum demand} \times 8760$$

$$= 0.7 \times 20 \times 8760$$

$$= 122.8 \text{ GWh}$$

308. *Ans. (b)*309. *Ans. (a)*310. *Ans. (a)*311. *Ans. (a)*312. *Ans. (c)*

$$P = 0.5 \rho A C_p V^3 \eta_g \eta_b$$

$\Rightarrow$

$$P \propto AV^3$$

$\Rightarrow$

$$P \propto D^2 V^3 \quad \left(\because A = \frac{\pi D^2}{4} \right)$$

313. *Ans. (b)*

A Pyrheliometer is an instrument to measure intensity of direct solar radiation at normal incidence.

314. *Ans. (b)*315. *Ans. (d)*

The load of a consumer is measured in KW.

316. *Ans. (d)*

Power (P) = 1000 watt

Time (t) = 4 hour

Day = 30 days

Energy consumed (KWh)

$$= \frac{\text{Power} \times \text{hour} \times \text{day}}{1000}$$

$$= \frac{1000 \times 4 \times 30}{1000}$$

$$= 120 \text{ Units}$$

Total cost = 120 × 0.35

$$= 42 \text{ rupees.}$$

317. *Ans. (c)*