Power Plant Engineering MCQ Questions PDF

1. The commercial sources of energy are

(a) fossil fuels, water and radioactive substances.

(b) solar, wind, biomass.

(c) wood, animal wastes and agricultural wastes.

(d) none of the above.

Answer: (a) fossil fuels, water and radioactive substances.

2. Which of the following power plants is the least reliable ?

(a) Wind.

(b) Tidal.

(c) Geothermal.

(d) Solar.

Answer: (a) Wind.

3. Which of the following methods of generating electric power from the sea water is more advantageous ?

(a) Ocean currents.

(b) Wave power.

(c) Tidal power.

(d) None of the above.

Answer: (c) Tidal power.

6. The power output from an hydroelectric power plant depends on

(a) type of dam, type of catchment area and discharge.

(b) type of dam, head and system efficiency.

(c) discharge, head and system efficiency.

(d) type of turbine, type of dam and type of catchment area.

Answer: (c) discharge, head and system efficiency.

14. In hydroelectric power plants

(a) operating cost is low and initial cost is high.

(b) operating cost is high and initial cost is low.

(c) both operating cost as well as initial cost are high.

(d) both operating cost as well as initial cost are low.

Answer: (a) operating cost is low and initial cost is high.

15. The advantage(s) of hydro plants is/are

(a) low operating cost.

(b) they can be started and loaded very quickly.

(c) they can be used as base load and peak load plants as well.

(d) all the above.

Answer: (d) all the above.

17. Gross head of an hydroelectric power station is

(a) the difference of water level between the level in the storage and tail race.

(b) the height of water level in the river where the tail race is provided. (c) the height of water level in the river where the storage is provided. (d) all of the above.

Answer: (a) the difference of water level between the level in the storage and tail race.

18. With reference to hydropower station, the graphical representation **of the discharge as a function of time is known as:**
(a) Monograph.

(b) Hectrograph.

(c) Load duration curve.

(d) Hydrograph.

Answer: (d) Hydrograph.

19. A graphical representation of the discharge and time is known as
(a) load curve.

(b) load duration curve.

(c) monograph.

(d) hectograph.

(e) hydrograph.

Answer: (e) hydrograph.

20. An hydrograph indicates
(a) the discharge at any time during the period under consideration.

(b) the maximum and minimum turn-off during the period.

(c) the average run-off during the period.

(d) all of the above.

Answer: (d) all of the above.

21. Hydrograph is similar to
(a) load duration curve.

(b) mass curve.

(c) energy load curve.

(d) chronological load curve.

Answer: (d) chronological load curve.

22. The factors affecting the run-off are
(a) rain fall pattern, shape and size of catchment area.

(b) the topography and nature of soil in the catchment area.

(c) amount of vegetation and weather condition in the catchment area. (d) all of the above.

Answer: (d) all of the above.

23. The flow duration curve at a given head of a hydroelectric plant is used to determine
(a) total power available at the site.

(b) total units of energy available.

(c) load-factor at the plant.

(d) diversity factor for the plant.

Answer: (a) total power available at the site.

24. The area under a flow duration curve represents.

(a) total units of energy available.

(b) total power available at site.

(c) total quantity of run-off during that period.

(d) maximum rate of run-off during that period.

Answer: (c) total quantity of run-off during that period.

25. A mass curve can be plotted from

(a) load duration curve.

(b) chronological load curve.

(c) energy load curve.

(d) both load duration curve and chronological load curve.

Answer: (b) chronological load curve.

26. Storage requirement can be determined from

(a) hydrograph.

(b) flow-duration curve.

(c) mass curve.

(d) either by hydrograph or by mass curve.

Answer: (d) either by hydrograph or by mass curve.

27. In hydropower stations what is an enlarged body of water just above the intake and used as a regulating reservoir, called?

(a) Spillways.

(b) Forebay.

(c) Reservoir.

(d) Penstock.

Answer: (b) Forebay.

28. A penstock is used as a conduit between
(a) the steam chest and the turbine in a thermal station

(b) the dam and the turbine in a hydrostation.

(c) the turbine and the discharge drain.

(d) the heat exchanger and the turbine in a nuclear power plant.

(e) None of these.

Answer: (b) the dam and the turbine in a hydrostation.

29. In high head hydroelectric power plant, the velocity of water flow in penstock is around
(a) 2 m/s

(b) 4 m/s

(c) 7 m/s

(d) 10 m/s

Answer: (c) 7 m/s

30. Location of a surge tank, in an hydroelectric power station, is near
(a) turbine.

(b) tail race.

(c) reservoir.

(d) dam.

Answer: (a) turbine.

31. The function of a surge tank is to
(a) supply water at constant pressure.

(b) relieve water hammer pressures in the penstock pipe.

(c) produce surge in the pipeline.

(d) none of the above.

Answer: (b) relieve water hammer pressures in the penstock pipe.

32. Water hammer occurs in
(a) surge tank.

(b) penstock.

(c) turbine casing.

(d) draft tube.

Answer: (b) penstock.

33. 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 variations in the penstock pipes due to sudden load changes.

(d) control the Water flow through the turbine.

Answer: (c) control the pressure variations in the penstock pipes due to sudden load changes.

34. Where is the draft tube of a hydropower station that is an airtight pipe located?

(a) Near the surge tank.

(b) In between the penstock and the runner.

(c) In between the runner exhaust and the tailrace.

(d) At the beginning of penstock.

Answer: (b) In between the penstock and the runner.

35. The draft tube is provided to

(a) raise the water surface of the stream to create an artificial head.

(b) reduce the effect of water hammer.

(c) increase the acting head on the water wheel.

(d) none of the above.

Answer: (c) increase the acting head on the water wheel.

36. For variable heads of near about but less than 30 metres, which type of turbines is used in hydropower stations?

(a) Pelton.

(b) Kaplan.

(c) Francis.

(d) None of the above.

Answer: (b) Kaplan.

37. For harnessing lower variable water heads, the suitable hydraulic turbine with high percentage of reaction and runner adjustable vanes is

(a) Kaplan

(b) Francis

(c) Pelton

(d) Impeller

Answer: (a) Kaplan

39. For high head and low discharge the water turbine used is

(a) Pelton wheel.

(b) Kaplan turbine.

(c) Francis turbine.

(d) propeller turbine.

Answer: (a) Pelton wheel.

40. The specific speed (N_s) of a turbine is given by the equation

(a) $N_s = N\sqrt{P} \div H^{0.75}$

(b) $N_s = P\sqrt{N} \div H^{3/2}$

(c) $N_s = N\sqrt{P} \div H^{1.25}$

(d) $N_s = N\sqrt{P} \div H^{2/3}$

Answer: (c) $N_s = N\sqrt{P} \div H^{1.25}$

41. The "specific speed" of a water turbine is the speed at which the turbine develops

(a) maximum horse power.

(b) unit horse power at all heads.

(c) unit horse power at unit head.

(d) minimum horse power.

Answer: (c) unit horse power at unit head.

42. The specific speeds of Kaplan, Francis and Pelton turbines are in

(a) the increasing order.

(b) the decreasing order.

(c) neither increasing nor decreasing order.

Answer: (b) the decreasing order.

43. An impulse turbine

(a) is most suited for low head and high discharge power plants

(b) operates by initial complete conversion to kinetic energy.

(c) makes use of a draft tube.

(d) always operates submerged.

Answer: (b) operates by initial complete conversion to kinetic energy.

44. Turbines installed at Bhakra Nangal are

(a) Pelton wheels.

(b) Francis turbines.

(c) Kaplan turbines.

(d) Propeller turbines.

Answer: (a) Pelton wheels.

45. In water turbines, the runaway speed of Pelton wheel is
(a) 1.8 times rated speed.

(b) 2 - 2.2 times rated speed.

(c) 2.5 - 3 times rated speed.

(d) full load speed.

Answer: (a) 1.8 times rated speed.

46. The number of buckets (Z) for a Pelton wheel in terms of jet ratio(m) is given by empirical relation
(a) Z = 15 m + 0.5

(b) Z = 0.5 m + 15

(c) Z = 2 m + 15

(d) Z = 2 + 15 m

Answer: (b) Z = 0.5 m + 15

47. In a reaction turbine, the function of draft tube is to
(a) reduce water hammer.

(b) increase flow rate of water.

(c) convert kinetic energy of water to potential energy by a gradual expansion in divergent part.

(d) none of the above.

Answer: (c) convert kinetic energy of water to potential energy by a gradual expansion in divergent part.

48. In Francis turbine runner, the number of blades is usually of the order of

(a) 16 - 24

(b) 8 - 10

(c) 6 - 8

(d) 3 - 6

Answer: (a) 16 - 24

49. The maximum head of a Kaplan turbine is limited to

(a) 25 m

(b) 70 m

(c) 125 m

Answer: (a) 25 m

50. Which of the following statements is/are correct? In pumped storage power plants,

(a) water is re-circulated through water turbines.

(b) reversible turbines are used which operate as turbines for power generation during peak load hours and as pumps for pumping water during peak-off hours.

(c) plain Francis turbines are used.

(d) both (a) and (c) above are employed.

Answer: (b) reversible turbines are used which operate as turbines for power generation during peak load hours and as pumps for pumping water during peak-off hours.

51. Consider the following statements regarding pumped storage plants:

1. A pumped storage plant is a base load plant.

2. The starting time of a pumped storage plant is very short.

3. Reversible turbines and pumps are highly suitable for pumped storage plants.

Which of the statements given above are correct?

(a) 1 and 2.

(b) 1 and 3.

(c) 2 and 3.

(d) 1, 2 and 3.

Answer: (c) 2 and 3.

52. In pump storage hydro-power-plant, the electrical machine is made to work alternately as generator and motor. The efficiency of the generator working at the same electric power level is

(a) greater than that as motor.

(b) equal to that as motor.

(c) less than that as motor.

(d) greater or less than that as motor depending on the type of the - machine.

Answer: (c) less than that as motor.

53. A 'Pumped storage hydroelectric plant' consists of

(a) A synchronous machine and a multistage centrifugal pump in one shaft.

(b) A synchronous machine, a reaction turbine, and a multistage centrifugal pump all fit one shaft.

(c) An induction generator, a synchronous machine and a reaction turbine, all in one shaft.

(d) An induction generator, a synchronous machine, and a multistage centrifugal pump, all in one shaft.

Answer: (b) A synchronous machine, a reaction turbine, and a multistage centrifugal pump all fit one shaft.

54. Consider the following statements: Pumped storage plants when operated in interconnected power systems serve to

1. increase load factor of steam plant.

2. provide added capacity to meet peak loads.

3. decrease load factor of steam plant.

4. provide added capacity to meet base loads. Which of the above statements are correct?

(a) 1, 2, 3 and 4.

(b) 1 and 3 only.

(c) 1 and 2 only.

(d) 3 and 4 only.

Answer: (c) 1 and 2 only.

55. Consider the following statements regarding the pumped storage plants:

1. A pumped storage plant is a peak load plant.

2. The starting time of a pumped storage plant is very long.

3. Reversible turbines and pumps are very suitable for pumped storage plants.

4. Pumped storage plants can be used for load frequency control.

Which of the above statements is/are correct?

(a) 1 only.

(b) 1 and 2 only.

(c) 1, 3 and 4.

(d) 3 and 4 only.

Answer: (c) 1, 3 and 4.

56. In India, pumped storage power plant
(a) does not exist at all.

(b) exists is Rajasthan alone.

(c) exists in Kadampurai (TN).

(d) exists in Haryana.

Answer: (c) exists in Kadampurai (TN).

57. The pumped storage scheme is employed to supply
(a) during the peak hours.

(b) during the off-peak hours.

(c) system base load.

Answer: (a) during the peak hours.

58. In pumped storage scheme, the generator is also used as

(a) induction generator or synchronous condenser.

(b) induction generator or synchronous motor.

(c) synchronous generator or induction generator.

(d) synchronous motor or synchronous condenser.

Answer: (d) synchronous motor or synchronous condenser.

59. Pump storage schemes are used to improve

(a) the power factor.

(b) the diversity factor.

(c) the load factor.

(d) the quality of voltage.

(e) the reactive power capacity.

(f) the plant capacity factor as well as the load factor of the power system.

Answer: (f) the plant capacity factor as well as the load factor of the power system.

60. A hydro power plant of run-off-river type should be provided with pondage so that the

(a) firm capacity of the plant is increased.

(b) operating head is controlled.

(c) pressure inside the turbine casing remains constant.

(d) kinetic energy of the running water is fully utilized.

Answer: (a) firm capacity of the plant is increased.

61. Bulb turbines are

(a) low head axial flow turbines.

(b) high speed turbines.

(c) high head turbines.

(d) high pressure turbines.

Answer: (a) low head axial flow turbines.

62. Bulb turbines

(a) can be used at very low and widely varying heads.

(b) are smaller, faster and easier to build than other types and are cheaper in capital cost than Kaplan turbines.

(c) are universally used for small hydro schemes.

(d) all of the above.

Answer: (d) all of the above.

63. In turbulent flow

(a) cohesion is more effective than momentum transfer in causing shear stress.

(b) shear stresses arc usually larger than those in laminar flow.

(c) the fluid particles move in an orderly manner.

(d) momentum transfer is on molecular scale only.

Answer: (b) shear stresses arc usually larger than those in laminar flow.

64. Rotameter is used for measuring

(a) fluid discharge.

(b) fluid density.

(c) fluid viscosity.

(d) all of the above.

Answer: (a) fluid discharge.

66. A steam power station needs space

(a) less than that required by the diesel power station of the same output.

(b) less than that required by atomic power station of the same output.

(c) less than that required by hydropower station of the same capacity.

(d) less than that required by a gas turbine power station of the same output.

Answer: (c) less than that required by hydropower station of the same capacity.

67. Consider the following statements concerning steam power plants:

1. Maintenance and operating costs are low.

2. Water is required in huge quantity.

3. Requires long time for starting.

4. Handling of coal and disposal of ash can be done easily.

Which of the above statements is/are correct?

(a) 1 only.

(b) 2 and 3.

(c) 3 only.

(d) 3 and 4.

Answer: (b) 2 and 3.

68. Operating cost of steam power station is

(a) less than that of nuclear power plants.

(b) less than that of diesel/gas turbine power plants.

(c) less than that of hydroelectric power plants.

(d) is the same as that of nuclear power plant.

Answer: (b) less than that of diesel/gas turbine power plants.

69. The public sector unit associated with the manufacturing of steam power plant equipment in India is

(a) Bharat Heavy Electricals Ltd.

(b) N.T.P.C.

(c) Heavy Engineering Corporation.

(d) Neyveli Lignite Corporation.

Answer: (a) Bharat Heavy Electricals Ltd.

70. Public sector undertaking associated with erection and commissioning of steam power plants in India is

(a) Indian Electricity Authority.

(b) National Thermal Power Corporation Ltd.

(c) Bharat Coking Coal Ltd.

(d) Coal India Ltd.

Answer: (b) National Thermal Power Corporation Ltd.

71. On which one of the following cycles does a modern steam power plant work?

(a) Carnet cycle

(b) Rankine cycle

(c) Otto cycle

(d) Bell-Coleman cycle

Answer: (b) Rankine cycle

72. Rankine cycle efficiency of a steam power plant is in the range of

(a) 20 - 30%.

(b) 30 - 45%.

(c) 45 - 60%.

(d) 60 - 80%.

Answer: (b) 30 - 45%.

73. In Rankine cycle, the work output from a turbine is given by

(a) change of enthalpy between inlet and outlet.

(b) change in internal energy between inlet and outlet.

(c) change of entropy between inlet and outlet.

(d) change in temperature between inlet and outlet.

Answer: (a) change of enthalpy between inlet and outlet.

74. Binary vapor cycles are used for

(a) increasing the turbine efficiency.

(b) improving the condenser performance.

(c) improving the plant efficiency.

(d) all of the above.

Answer: (c) improving the plant efficiency.

75. Binary vapor cycles are not being adopted because

(a) initial cost of such plants is high.

(b) such plants are suitable for high load factors only.

(c) pipes of thicker sections are required.

(d) ideal vapors are not available.

Answer: (a) initial cost of such plants is high.

76. The overall efficiency of a thermal power station is equal to

(a) that of Rankine cycle.

(b) that of regenerative cycle.

(c) that of Binary vapour cycle.

(d) product of boiler efficiency, turbine efficiency and generator efficiency.

Answer: (d) product of boiler efficiency, turbine efficiency and generator efficiency.

77. Rankine cycle operating between pressure limits of P_1 and P_2 has thermal efficiency

(a) lower than that of Carnot cycle operating between same pressure limits.

(b) higher than that of Carrot cycle operating between same pressure limits.

(c) same as that of Carrot cycle operating between same pressure limits.

(d) none of the above.

Answer: (b) higher than that of Carrot cycle operating between same pressure limits.

78. Reheat cycle in a steam power station is employed for

(a) improving thermal efficiency.

(b) improving condenser performance.

(c) reducing heat losses.

(d) utilizing heat of flue gases.

Answer: (a) improving thermal efficiency.

79. In a regenerative cycle, feed water is heated by

(a) heaters.

(b) drained steam from the turbine.

(c) exhaust gases.

(d) all of the above.

Answer: (b) drained steam from the turbine.

80. In a regenerative feed heating cycle,

(a) the optimum value of the fraction of steam extracted for feed water heating increases with the increase in Rankine cycle efficiency.

(b) the greatest economy is affected when steam is extracted from several places in different stages of the steam turbine.

(c) thermal efficiency is reduced.

(d) both (a) and (b).

Answer: (d) both (a) and (b).

81. What is the approximate efficiency of a normal thermal power station?

(a) 30 - 40%

(b) 45 - 55%

(c) 20 - 25%

(d) 60 - 70%

Answer: (a) 30 - 40%

82. In a thermal power station, a typical heat balance sheet, for a large turbine and surface condenser taken together, is the percentage distribution of heat energy in:

1. work done or thermal efficiency.

2. friction and windage loss.

3. heat to circulating water.

4. heat in condensate to be retained to the boiler.

The percentage amount of heat in the heads stated above, in the descending order is:

(a) 3, 4, 1 and 2.

(b) 2, 1, 4 and 3.

(c) 3, 1, 4 and 2.

(d) 2, 4, 1 and 3.

Answer: (c) 3, 1, 4 and 2.

83. Maximum efficiency of modern coal fired steam-raising thermal power plants is restricted to about 0.35 (a low value), mainly because of

(a) low alternator efficiency.

(b) high energy ions in boilers.

(c) low steam turbine mechanical efficiency.

(d) high energy loss from turbine exhaust to condenser.

Answer: (d) high energy loss from turbine exhaust to condenser.

84. Which of the following contributes to the Rankine cycle efficiency improvement in a steam power plant ?
(a) Use of high pressure.

(b) Reheat of steam at intermediate stages.

(c) Use of steam for heating of boiler feed water.

(d) All of the above.

Answer: (d) All of the above.

85. The steam power plant efficiency can be improved by
(a) using large quantity of water.

(b) burning large quantity of coal.

(c) using high pressure and high temperature steam.

(d) decreasing the load on the plant.

Answer: (c) using high pressure and high temperature steam.

86. The average load factor of thermal power plants in India is
(a) 100%

(b) 80 - 95%

(c) 50 - 60%

(d) 35 - 45%

(e) 20 - 30%

Answer: (c) 50 - 60%

87. As the size of a thermal generating unit increases, the capital cost per kW of installed capacity

(a) increases.

(b) decreases.

(c) remains the same.

(d) may increase or decrease.

Answer: (b) decreases.

88. The modern trend in electric power generation is

(a) to have a large number of small size thermal plants located at different places.

(b) to have large size thermal plants near load centers.

(c) to have large size thermal plants located near coal fields.

(d) none of the above.

Answer: (c) to have large size thermal plants located near coal fields.

89. In the feed water and steam circuit of a thermal power plant, the condensate flows from the condensate extraction pump to the boiler feed pump and, then to the boiler. The HP and LP heaters are located in this circuit in relation to the boiler feed pump (BFP) as

(a) both HP and LP heaters after BFP.

(b) HP heater before and, LP heater after BFP.

(c) both HP and LP heaters before BFP.

(d) LP heater before and, HP heater after BFP.

Answer: (d) LP heater before and, HP heater after BFP.

90. In thermal power plants, the pressure in the working fluid cycle is developed by

(a) condenser.

(b) superheater.

(c) feed water pump.

(d) turbine.

Answer: (c) feed water pump.

91. Deaerative heating is done to

(a) heat the steam.

(b) heat the feed water.

(c) remove dissolved gases in water.

(d) remove dissolved solid impurities in water.

Answer: (c) remove dissolved gases in water.

92. In a thermal power plant, the feed water coming to the economiser is heated using

(a) HP steam.

(b) LP steam.

(c) direct heat in the furnace.

(d) flue gases.

Answer: (d) flue gases.

93. Arrange the following in the correct sequence in which the flue gas passes through them after coming out of the boiler in a thermal power station:

(1) ID Fan.

(2) Air preheater.

(3) Economiser.

(4) Electrostatic precipitator.

Select the answer using the codes given below

(a) 4, 3, 2, 1

(b) 3, 2, 4, 1

(c) 2, 1, 4, 3

(d) 1, 4, 3, 2

Answer: (b) 3, 2, 4, 1

94. In bleeder turbines, part of the steam is extracted for

(a) condensation.

(b) reheating.

(c) feed water heating.

(d) secondary air heating.

Answer: (c) feed water heating.

95. Which of the following is not a fire tube boiler ?

(a) Babcock and Wilcox.

(b) Lancashire.

(c) Locomotive.

(d) Cochron.

Answer: (a) Babcock and Wilcox.

96. Water is supplied to the boiler at
(a) atmospheric pressure.

(b) more than steam pressure in the boiler.

(c) slightly more than atmospheric pressure.

(d) any pressure.

Answer: (b) more than steam pressure in the boiler.

97. The efficiency of a boiler used in a modem steam power plant is of the order of
(a) 30%

(b) 50%

(c) 85%

(d) 100%

Answer: (c) 85%

98. Steam pressure used in steam power plants in India is in the range of
(a) 110 - 170 kg/cm^2

(b) 40 - 80 kg/cm^2

(c) 20 - 40 kg/cm^2

(d) 250 kg/cm^2

Answer: (a) 110 - 170 kg/cm^2

99. Critical pressure for steam is in the range of

(a) 50 - 100 kg/cm^2

(b) 100 - 200 kg/cm^2

(c) 200 - 250 kg/cm^2

(d) above 300 kg/cm^2

Answer: (c) 200 - 250 kg/cm^2

100. A super critical boiler is one that operates above the pressure and temperature of the following values

(a) 100 kg/cm^2 and 540°C

(b) 218 kg/cm^2 and 540°C

(c) 100 kg/cm^2 and 373°C

(d) 218 kg/cm^2 and 373°C

Answer: (b) 218 kg/cm^2 and 540°C

101. In a boiler, the carry over of slugs of water into the piping because of dirty water is called the

(a) foaming.

(b) pitting.

(c) scalping.

(d) beating.

Answer: (b) pitting.

102. Which of the following steam will have least enthalpy ?

(a) Dry and saturated steam at 25 kg/cm^2.

(b) Wet steam at 25 kg/cm^2.

(c) Superheated steam at 25 kg/cm^2.

(d) All of the above will have the same enthalpy.

Answer: (b) Wet steam at 25 kg/cm^2.

103. The boilers using lignite as fuel do not use

(a) spreader stoker.

(b) travelling grate stoker.

(c) underfeed stoker.

(d) all of the above.

Answer: (c) underfeed stoker.

104. Pipes carrying steam are generally of

(a) steel.

(b) cast iron.

(c) aluminum.

(d) cobalt.

Answer: (a) steel.

105. For given power a water tube boiler occupies

(a) less floor area and less height.

(b) more floor area and less height.

(c) less floor area and more height.

(d) more floor area and more height than a fire tube boiler.

Answer: (c) less floor area and more height.

106. The selection of the type and size of a steam boiler depends upon

(a) the power required and working pressure.

(b) the geographical position of the powerhouse.

(c) the fuel and water availability.

(d) all of the above factors.

Answer: (a) the power required and working pressure.

107. In a superheater

(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 the same.

Answer: (c) temperature rises and pressure remains unchanged.