Power Generation

1. Condensers in thermal power plants are used for condensing
(a) Steam to water
(b) water to ice*
(c) carbon dioxide to dry ice

2. Diversity factor x maximum demand is
(a) average demand
(b) sum of consumers' maximum demand*
(c) generated power

3. A generating station which has a high investment cost and low operating cost is usually operated as
(a) peak load station
(b) base load station*
(c) medium load station

4. According to Indian Electricity Act, the permissible voltage drop at the consumer terminals of a distribution feeders is
(a) 10 %
(b) 12 %
(c) 6 %*

5. Under frequency operation of power systems is undesirable as it causes
(a) damage to hydro units
(b) reduces the line reactance*
(c) increases line reactance

6. In order to have lower cost of electrical energy generation it is required to have
(a) low load factor and diversity factor
(b) low load factor but high diversity factor
(c) high load factor but low diversity factor*

7. The function of the economiser is to
(a) heat up the incoming water with exhaust steam
(b) heat up the incoming water by exhaust gases*
(c) heat up the incoming air by exhaust gases

8. The purpose of " Boiler Feed pump" is to
(a) pump hot air into boiler
(b) pump coal into boiler
(c) pump water into boiler*

9. The purpose of Moderator in a Nuclear Power Plant is to
(a) control the flow of water inlet
(b) control the amount of nuclear fuel into the reactor
(c) control the nuclear fusion or fission rate by slowing down the neutrons*

10. Which of the following plants has the maximum capital cost ?
(a) Steam plants
(b) Hydro-plants*
(c) Nuclear plants

11. One Kg of neutral Uranium gives energy equivalent to about
(a) 100 Kg coal*
(b) 1000 Kg coal
(c) 5000 Kg coal

12. As the load factor of a generating plant increase, the generation cost per kWh energy generated
(a) decreases*
(b) increases
(c) remains the same

13. As the size of thermal generating unit increase, the capital cost per KW if installed capacity
(a) increases
(b) decreases*
(c) remains the same

14. Steam turbo alternators have
(a) 2 poles*
(b) 4 poles
(c) 6 poles

15. A mass curve can be plotted from
(a) load duration curve

(b) Chronological load curve*
(c)energy load curve

16. Two areas of A and B have equal connected loads. However load diversity in area A is more than in area B. Then
(a) maximum demands of the two areas would be equal
(b) maximum demand of A would be more than that of B*
(c) maximum demand of B would be more than that of A

17. Which of the following generating plants has the minimum operating cost ?
(a) Steam plant
(b) Hydro-electric plant*
(c) Nuclear plant

18. Large size steam plants and nuclear plants are suitable for
(a) peak loads
(b) intermediate loads
(c) base loads*

19. Generators for base load plants are usually designed for maximum efficiency around
(a) 20 % overload
(b) full load*
(c) 75 % full load

20. The area under the load curve divided by 24 hours gives
(a) average load
(b) peak load*
(c) least load

21. Standard domestic ac supply voltage in India is
(a) 220 volt
(b) 230 volts*
(c) 240 volts

22. A large diversity factor of the load in a power system
(a) reduces the installation cost*
(b) increases the installation cost
(c) does not affect the installation cost

23. In a nuclear reactor thermal energy is obtained from
(a) fission of radioactive materials
(b) fusion of radioactive materials*
(c) burning of fuel rods in air

24. Base load of a power station stands for?
(a) 12-24 hours/day*
(b) 2-4 hours/day
(c) 8-12 hours/day
(d) 4-8 hours/day (SSC JE 2015)

25. Which of the following power plants employs the Rankine cycle?
(a) Nuclear power plant
(b) Solar power plant
(c) Thermal power plant*
(d) Hydro-electric power plant
(SSC JE 2019)

26. At times of peak loads, a power system needs
(a) injection of lagging VAR's*
(b) Injecting of leading VAR
(c) none of (a) and (b)
(d) both of (a) and (b) alternately
(SSC JE 2011)

27. The function of condenser in Thermal power plant is
(a) Purify steam
(b) Condense used steam into water*
(c) Condense water
(d) Purify water (SSC JE 2019)

28. Which type of fan used between dust collector
and chimney in thermal power plant:
(a) Forced draft
(b) Induced draft*
(c) Ceiling fan
(d) Table fan (SSC JE 2018)

29. The overall efficiency of the steam power plant is defined as:
(a) heat equivalent of mechanical output/heat of combustion of coal
(b) heat equivalent of electrical output/heat of combustion of coal*
(c) heat equivalent of electrical output/heat eq of mechanical output

(d) electrical output/heat of combustion of coal (SSC JE 2020)

30. In a steam power plant, the condensate from the condenser is used:
(a) to cool the generator
(b) as feed water to the boiler*
(c) to cool the turbine
(d) to cool the boiler (SSC JE 2020)

31. A steam power station has thermal efficiency of 30% and electrical efficiency of 90%, what is the overall efficiency of the station?
(a) 27%*
(b) 33%
(c) 90%
(d) 30% (SSC JE 2020)
Hint: Overall efficiency = Thermal efficiency × Electrical efficiency

32. A modern coal-fired thermal power station consumes about _____ of its power for supplying to the auxiliaries.
(a) 40 %
(b) 10 %*
(c) 20 %
(d) 30 % (SSC JE 2020)

33. Calculate the overall efficiency of a steam thermal power plant, if boiler efficiency is 85% turbine efficiency is 40% and alternator efficiency is 95%.
(a) 73.3%
(b) 32.3%*
(c) 43.5%
(d) 25.3% (SSC JE 2020)
Hint: Overall efficiency of a steam thermal power plant = boiler efficiency × turbine efficiency × alternator efficiency

34. Turbine efficiency of a steam thermal power plant varies between:
(a) 65 to 75%
(b) 55 to 65%
(c) 25 to 35%*
(d) 80 to 90% (SSC JE 2020)

35. Which of the following feed water treatments is basically one type of thermal treatment?

(a) Filtration
(b) Deaeration*
(c) Sedimentation
(d) Coagulation (SSC JE 2021)

36. A steam power station has an overall efficiency of 25% and 0.5 kg of coal is burnt per kWh of electrical energy generated. Determine the calorific value of fuel.
(Take heat equivalent of 1 kWh as 860 kcal)
(a) 4650 kcal/kg
(b) 3400 kcal/kg
(c) 1720 kcal/kg
(d) 6880 kcal/kg* (SSC JE 2021)
Hint:

$$CV = \frac{860 \, kcal}{\eta(coal \, burnt \, / \, kWh)}$$

37. The following data is available for a steam power station:
Maximum demand = 25 MW
Load factor = 0.4
Coal consumption = 0.88 kg/kWh
Boiler efficiency = 85%
Turbine efficiency = 90%
Price of coal = ₹ 55 per tones
Find the thermal efficiency of the station.
(a) 76.5%*
(b) 62.32%
(c) 65.2%
(d) 99.8% (SSC JE 2021)
Hint: Thermal efficiency = Boiler efficiency ×Turbine efficiency

38. In a steam power plant, blow down is basically nothing but wastage of _____ from the boiler.
(a) unburnt coal
(b) flue gases
(c) water*
(d) ash (SSC JE 2021)

39. In a steam power plant, the value of the reheat factor is of the order of:
(a) 1.6 to 2.0
(b) 0.5 to 1.0
(c) 1.1 to 1.5*
(d) 2.1 to 3.0 (SSC JE 2021)
Hint: Reheat factor is the ratio of cumulative heat drop to the adiabatic drop heat from

initial condition to exhaust pressure.

40. P= QHg is the water power equation. Head 'H' is measured in meter, 'g' gravity constant is measured in meter second sequence, then the measuring unit of 'Q' flow rate of water is
(a) Metere per hour
(b) Cubic meter per second*
(c) Square meter per second
(d) Meter per second (SSC JE 2019)

41. _____ is a tube that brings water to turbines.
(a) Forebay
(b) Trash rack
(c) Spillway
(d) Penstock* (SSC JE 2019)

42. Water hammer effect is expected in —?
(a) draft tube
(b) penstock*
(c) surge tank
(d) turbine casing (SSC JE 2019)

43. What is the function of turbine in hydro power plant?
(a) Produce electrical power
(b) Produce hydropower
(c) Produce heat power
(d) Produce mechanical power*
(SSC JE 2018)

44. Of the following water turbines, which is not a reaction turbine?
(a) Pelton wheel*
(b) Kaplan turbine
(c) Propeller turbine
(d) Francis turbine (SSC JE 2011)

45. Low head plants generally use :
(a) Pelton turbines
(b) Francis turbines
(c) Kaplan turbines*
(d) both (a) and (b) (SSC JE 2011)
Hint:
Kaplan turbine - Low head
Francis turbine - Medium head
Pelton turbine - High head

46. A hydroelectric generating plant is supplied from a reservoir of capacity 3.6×10^6 m^3 at a head of 100 m. Find the total energy available in kWh if the overall efficiency is 75%.
(a) 735750*
(b) 536750
(c) 63675
(d) 35750 (SSC JE 2021)
Hint: Electrical energy = W × H × η,
Where, W = Weight of water
H = Head
η = Overall efficiency

47. Which of the following is the function of the moderator in a nuclear reactor?
(a) Controlling chain reaction*
(b) Stopping chain reaction
(c) Starting chain reaction
(d) Transferring the heat produced inside the reactor to the heat exchanger (SSC JE 2019)

48. Identify the correct statement regarding a nuclear power plant?
(a) Graphite is used as an electrode
(b) Graphite is used as fuel
(c) Graphite is used as a moderator*
(d) Graphite is used as a coolant
(SSC JE 2019)

49. A diesel power station has fuel consumption of 0.215 kg per kWh, the calorific value of fuel being 10,000 kcal/kg. Determine the overall efficiency.
(a) 40%*
(b) 30%
(c) 45%
(d) 55% (SSC JE 2020)
Hint: Heat equivalent of 1kWh = 860 k.Cal
Electrical output = 860 k.Cal/kWh
Heat of combustion = 10,000×0.215
= 2150 k.Cal/kWh
Efficiency = 860/2150

50. Which of the following power plants has the lowest initial cost?
(a) Hydel power plant
(b) Thermal power plant
(c) Gas power plant*
(d) Nuclear power plant (SSC JE 2020)

51. The objective function to the optimisation problem in a hydro-thermal system becomes
A. minimise the fuel cost of thermal plants
B. minimise the time of operation
C. minimise the water availability of hydrogeneration
(a) only A*
(b) only B
(c) only C
(d) A, B and C (SSC JE 2017)

52. Demand factor of a power plant is.
(a) Average demand/plant capacity
(b) Station energy output/average demand
(c) Maximum demand/connected load*
(d) Average demand/maximum demand
(SSC JE 2011)

53. Plant capacity factor of power plant may be calculated by the formula:
(a) Averagedemand/Plant capacity*
(b) Sumof individual max.demand/Max.demand of plant
(c) Station output/Plant Hours of use
(d) Plant capacity/Average demand
(SSC JE 2011, 2020)

54. The ratio of average load to maximum load is referred to as:
(a) Form factor
(b) Diversity factor
(c) Ripple factor
(d) Load factor* (SSC JE 2020)

55. The maximum demand of a consumer is 2 kW and his daily energy consumption is 20 units. His load factor is
(a) 50%
(b) 41.6%*
(c) 35%
(d) 60% (SSC JE 2014)
Hint: Average load = Energy consumption/time

56. The ratio of the sum of the individual maximum demands to the maximum demand of the whole system under consideration is called as:
(a) load factor
(b) demand factor

(c) diversity factor *
(d) power factor (SSC JE 2017)

57. Annual load factor of a generation station is equal to
(a) No.of unit actually supplied/month max.possible demand×8760
(b) No.of units actually supplied/year max.possible demand
(c) No.of unit actually supplied/year max.possible demand×8760
(d) No.of unit actually supplied/month max.possible demand (SSC JE 2019)

58. A factory runs in 3 shifts of 8 hours each, in which it consumer 30 kW, 15 kW and 25 kW in each shift respectively. Calculate the energy (in kWh) consumed by the factory per day.
(a) 186.67
(b) 373
(c) 560*
(d) 746.67 (SSC JE 2018)
Hint: Energy consumed per day
(E) $= 8 \times 30 + 8 \times 15 + 8 \times 25$
$= 240 + 120 + 200$
$= 560$ kWh

59. Diversity factor has direct effect on the:
(a) Variable cost of the unit generated
(a) Both variable and fixed cost of unit generated
(c) Operating cost of unit
(d) Fixed cost of the unit generated*
(SSC JE 2014)

60. A generating station supplies the following loads 15000 kW, 12000 kW, 8500 kW, 6000 kW and 450 kW. The station has maximum demand of 22000 kW. Calculate the diversity factor.
(a) 0.68
(b) 1.34
(c) 1.91*
(d) 0.52 (SSC JE 2014)
Hint: Diversity factor = sum of maximum load connected/maximum demand byconnected load

61. The distribution losses that the utility suffers while transferring power from

generating station to the consumer is accounted under:
(a) Running Charges*
(b) Cost of fuel
(c) Maintenance cost
(d) Fixed charges (SSC JE 2014)

62. In power plant if the maximum demand on the plant is equal to the plant capacity, then:
(a) diversity factor will be unity
(b) load factor will be unity
(c) load factor will be nearly 60%
(d) plant reserve capacity will be zero*
(SSC JE 2014)

63. If F is the load factor, the loss load factor is given by:
(a) $0.25\ F^2 + 0.85\ F$
(b) $0.75\ F + 0.20\ F^2$
(c) $0.35\ F + 0.7\ F^2$
(d) $0.25\ F + 0.75\ F^2$* (SSC JE 2014)

64.. A consumer has annual consumption of 7,00,800 unit. If his maximum demand is 200 kW. The load factor will be:
(a) 40%*
(b) 50%
(c) 70%
(d) 20% (SSC JE 2014)
Hint: Load factor = Energy consumption/(Maximum demand × time period)

65. The value of demand factor is :
(a) less than one*
(b) greater than one
(c) equal to one
(d) Zero (UJVNL JE 2016, SSC JE 2008)

66. The value of diversity factor is–
(a) less than one
(b) greater than one*
(c) equal to one
(d) any one of the above
(SSC JE 2010, 2017)

67. The tarrif most suitable for large industrial consumers is
(a) Flat demand rate
(b) Block meter rate

(c) Two part tarrif *
(d) All the above (SSC JE 2010)
Hint: When the rate of electrical energy consumption is charged on the basis of maximum demand of the consumer and the units consumed, is known as two part tariff. In case of two-part tariff, the total charges are spilt into two components viz. fixed charges and running charges. The fixed charges depend upon the maximum demand of the consumer whereas the running charges depend upon number of units consumed.

68. The knowledge of diversity factor helps in computing
(a) plant capacity*
(b) average load
(c) units generated
(d) peak demand (SSC JE 2010)

69. A building has 3 floors and each floor has 4 fans of 50 W that operates for 12 hours a day and one air conditioner of 3000 W that operates for 2 hours per day in the month of the June. Determine the energy consumption (in kWh) of the building in June.
(a) 512
(b) 525
(c) 756*
(d) 504 (SSC JE 2018)

70. The connected load of a consumer is 2 kW and his maximum demand is 1.5 kW. The demand factor of the consumer is :
(a) 0.75*
(b) 0.375
(c) 1.33
(d) 1 (SSC JE 2009)

71. In a system, if the base load is the same as the maximum demand, the load factor will be
(a) 1.0*
(b) 0.5
(c) zero
(d) infinity (SSC JE 2011)

72. Calculate the January month electricity bill for a room containing 40W lamp

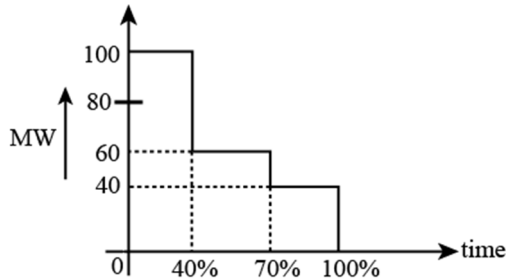working 10 hours daily and unit cost is 1 rupee.
(a) ₹ 13.4
(b) ₹ 12.4*
(c) ₹ 11.4
(d) ₹ 10.4 (SSC JE 2018)

73. Load factor for the load duration curve shown below is

(a) 1.0
(b) 0.7*
(c) 0.6
(d) 0.5 (SSC JE 2011)
Hint:

$$P_{av} = \frac{100x0.4 + 60x0.3 + 40x0.3}{(0.4 + 0.3 + 0.3)} = 70Mw$$

P_{max} = 100 MW
LF = 70/100

74. Which of the following is true?
(a) Load factor = Capacity factor × utilization factor
(b) Utilisation factor = Capacity factor × load factor
(c) Capacity factor = Load factor + utilisation factor
(d) Capacity factor = Load factor × utilisation factor* (SSC JE 2013, 2011)

75. A consumer has a maximum demand of 200 kW at 40% load factor. If the tariff is ₹ 200 per kW of maximum demand plus 10 paise per kWh, find the annual charges.
(a) ₹ 1,10,080*
(b) ₹ 90,080
(c) ₹ 1,50,080
(d) ₹ 1,20,080 (SSC JE 2020)
Hint: Unit consumed per year = Maximum demand ×load factor × hours in a year
Annual charges = maximum demand charges + energy consumed charges

76. Suppose a plant that has installed capacity of 20 MW produces annual output of $7.35×10^6$ kWh and remains in operation for 2190 hours in a year. Find the plant use factor.
(a) 18.5%
(b) 25.5%
(c) 16.7%*
(d) 14.5% (SSC JE 2020)
Hint: Plant use factor = Annual output/(Plant capacity× Hours of use)

77. A power station has a maximum demand of 15,000 kW. The annual load factor is 50% and plant capacity factor is 40%. Determine the reserve capacity of the plant.
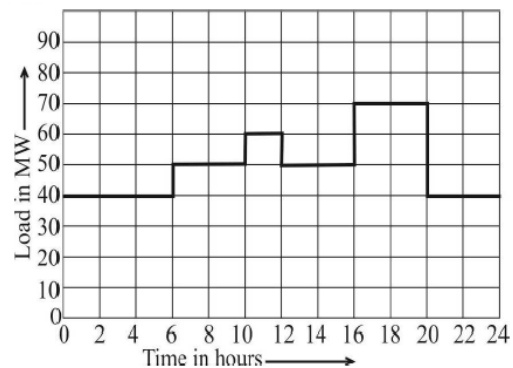(a) 375 kW
(b) 37.5 kW
(c) 37.5 MW
(d) 3.75 MW* (SSC JE 2020)
Hint: Average load = Load factor × Maximum demand
Plant capacity = Average demand /Plant capacityfactor
Reserve capacity of plant = Plant capacity– Maximum Plant

78. Determine the average load from the load curve.

(a) 45 MW
(b) 50 MW*
(c) 55 MW
(d) 40 MW
SSC JE 29.10.2020
Hint: Average load = Units generated/day/24 hours
Units generated/day = Area (in MWh) under the load curve.

=[40×6 + 50× 4 + 60× 2 + 50× 4 + 70× 4 + 40× 4] MWh

79. To reduce the cost of the electricity generated (a) the load factor and diversity factor must be low
(b) the load factor must be low and but diversity factor high
(c) the load factor must be high but diversity factor low
(d) the load factor and diversity factor must be high* (SSC JE 2014)

80. An industrial consumer has a daily load pattern of 2000 kW, 0.8 P.F. for 12 hours and 1000 kW UPF for 12 hours. The load factor is
(a) 0.5
(b) 0.75*
(c) 0.6
(d) 2.0 (SSC JE 2014, 2017)
Hint: (i) 12 hours. 2000 kW, 0.8 lag
(ii) 12 hours. 1000 kW, UPF
Energy consumption (in kWh)
= 2000×12+1000×12 = 3000×12 kWh
maximum demand = 2000 kW
Energy consumption (kWh)
Load factor/maximum demand ×time (hour)

81. The maximum continuous power available from a hydroelectric plant under the most adverse hydraulic conditions is known as ——
(a) base power
(b) firm power*
(c) primary power
(d) secondary power (SSC JE 2017)
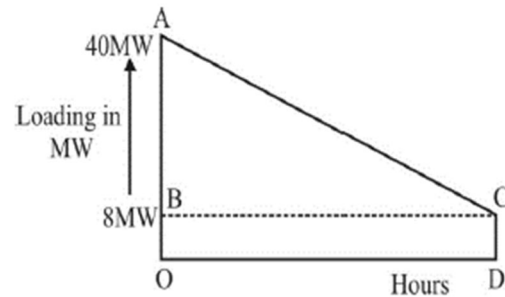
82. The area under load curve represents —
(a) System voltage
(b) Current
(c) Energy consumed*
(d) Maximum demand (SSC JE 2017)

83. The annual load duration curve of power supply system may be considered as straight line from 40 MW to 8 MW. The load factor of the system is ——
(a) 20%
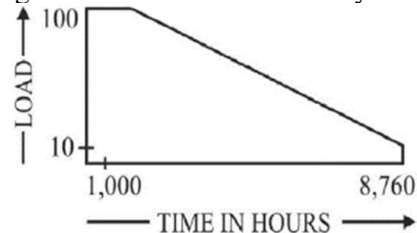(b) 50%
(c) 60% *

(d) 83.33% (SSC JE 2017)
Hint:

Average load = area under curve/time

$$= \frac{Area\ of\ \Delta ABC + Area\ of\ quadrilateral}{24}$$

$$= \frac{\frac{1}{2} x32x24 + 8x24}{24}$$

LF = Average load/max demand

84. The load curve of a system is shown in the figure. The load factor of the system is

(a) 1.66%
(b) 6.013%
(c) 16.66%
(d) 60.13%* (SSC JE 2017)

85. A generation station has the following details: Unit generated in 24 hrs = 62,500 kWh, max demand = 4000 kW and rated capacity of the plant = 6000 kW. Find the capacity factor of the plant.
(a) 20%
(b) 13.3%
(c) 23.3%
(d) 43.4%* (SSC JE 2020)
Hint: Daily average electrical load of plant
= Generated Energy in a day/24
% Capacity factor = (Average load/Plant capacity) x 100

86. For a power plant maximum demand is 50 MW and the sum of individual maximum demands is 56 W. Find the diversity factor.
(a) 0.89
(b) 1.5
(c) 0.5
(d) 1.12* (SSC JE 2020)

87. Which of the following types of tendering should be resorted to only in case of an emergency requirements?
(a) Proprietary tendering
(b) Global tendering
(c) Spot tendering*
(d) Open tendering (SSC JE 2021)

88. Usually, the expenditure on supervision charges is estimated to be____of the total cost.
(a) 3% to 5%
(b) 5% to 10%
(c) 0.1% to 0.3%
(d) 1% to 1.5%* (SSC JE 2021)

89. Lighting in restaurants and malls is an example of _____.
(a) Domestic load
(b) Commercial load*
(c) Industrial load
(d) Agriculture load (SSC JE 2021)

90. A consumer is offered the following rate of tariff. He has to pay a fixed charge of ₹ 1,000 per month and a running charge of ₹ 4.50 per unit consumed. If the consumer runs a motor load of 1 KW at 0.85 power factor lagging on an average of 15 hours per day, his annual bill is
(a) ₹ 25637.50
(b) ₹ 36637.50*
(c) ₹ 40985.29
(d) ₹ 32941.88 (SSC JE 2012)