Power Plant Engineering PDF – 2

1. The main objectives of load frequency control in a power system are:

1. to bring the steady state error to zero after load change.

2. to maintain the net tie-line flow.

3. to maintain voltages on all buses.

4. to economize the cost of generation.

(a) 1 and 2.

(b) 2 and 3.

(c) 3 and 4.

(d) 1, 2, 3 and 4.

Answer: (a) 1 and 2.

2. In AGC, the voltage and frequency is controlled by

(a) excitation control.

(b) turbine control.

(c) turbine speed control and excitation control respectively.

(d) excitation control and turbine speed control respectively.

Answer: (c) turbine speed control and excitation control respectively.

3. The main objective of load frequency controller is to apply control of:

(a) frequency alone.

(b) frequency and at the same time of real power exchange via the outgoing lines.

(c) frequency and at the same time of reactive power exchange via the outgoing lines.

(d) frequency and bus voltages.

Answer: (b) frequency and at the same time of real power exchange via the outgoing lines.

4. Load frequency control uses

(a) proportional controllers alone.

(b) integral controllers alone.

(c) both proportional and integral controllers.

(d) either proportional or integral controllers.

Answer: (c) both proportional and integral controllers.

5. Load frequency controls are carried out with

(a) **P** controllers only.

(b) **I** controllers only.

(c) **D** controllers only.

(d) **PID** controllers.

Answer: (d) PID controllers.

6. Consider the following statements regarding load frequency control:

1. Time constant of automatic load frequency control is about 15 seconds.

2. Integral control eliminates static frequency drop.

3. In tie-line load bias control, the control signal for each area is proportional to change in frequency as well as change in tie-line power.

Which of the statements given above are correct?

(a) 1, 2 and 3.

(b) 1 and 2.

(c) 1 and 3.

(d) 2 and 3.

Answer: (d) 2 and 3.

7. An isolated 50 Hz synchronous generator is rated at 15 MW which is also the maximum continuous power limit of its prime mover. It is equipped with a speed governor with 5% droop. Initially, the generator is feeding three loads of 4 MW each at 50 Hz. One of these loads is programmed to trip permanently if the frequency falls below 48 Hz. If an additional load of 3.5 MW is connected then the frequency will settle down to

(a) 49.417 Hz

(b) 49.917 Hz

(c) 50.083 Hz

(d) 50.583 Hz [GATE E.E. 2007]

Answer: (a) 49.417 Hz

8. A power system has two synchronous generators. The Governor-turbine characteristics corresponding to the generators are

$P_1 = 50\ (50 - f)$,

$P_2 = 100\ (51 - f)$

where **f** denotes the system frequency in Hz, and P_1 and P_2 are, respectively, the power outputs (in MW) of turbines 1 and 2. Assuming the generators and transmission network to be lossless, the system frequency for a total load of 400 MW is

(a) 47.5 Hz

(b) 48.0 Hz

(c) 48.5 Hz

(d) 49.0 Hz [GATE E.E. 2001]

Answer: (a) 47.5 Hz

9. For a synchronous generator connected to an infinite bus through a transmission line, how are the change of voltage (ΔV) and the change of frequency (Δf) related to the active power (P) and the reactive power (Q)?

(a) ΔV is proportional to P and Δf to Q.

(b) ΔV is proportional to Q and Δf to P.

(c) Both ΔV and Δf are proportional to P.

(d) Both ΔV and Δf are proportional to Q.

Answer: (b) ΔV is proportional to Q and Δf to P.

10. The voltage of a bus can be controlled by controlling the

(a) phase angle.

(b) reactive power of the bus.

(c) active power of the bus.

(d) phase angle and the reactive power.

Answer: (b) reactive power of the bus.

11. The permissible variation of frequency in power system is

(a) ± 1%

(b) ± 3%

(c) ± 5%

(d) ± 10%

Answer: (b) ± 3%

12. When there is a change in load in a power station having a number of generator units operating in parallel, the system frequency is controlled by

(a) adjusting the steam input to the units.

(b) adjusting the field excitation of the generators.

(a) changing the load divisions between the units.

(d) injecting reactive power at the station bus-bar.

Answer: (a) adjusting the steam input to the units.

13. Load frequency control is achieved by properly matching the individual machine's

(a) reactive powers.

(b) generated voltages.

(c) turbine inputs.

(d) turbine and generator ratings.

Answer: (c) turbine inputs.

14. In the load-frequency control system with free governor action, the increase in load-demand under steady conditions is met

(a) only by increased generation due to opening of steam valve.

(b) only by decrease of load-demand due to drop in system frequency.

(c) partly by increased generation and partly by decrease of load demand.

(d) partly by increase generation and partly by increased excitation

Answer: (c) partly by increased generation and partly by decrease of load demand.

15. During load shedding

(a) system voltage is reduced.

(b) system frequency is reduced.

(c) system loads are switched off.

(d) system power factor is changed.

Answer: (c) system loads are switched off.

16. When the power system is not in a position to meet the load it will resort to

(a) power factor improvement at the generators.

(b) load shedding.

(c) efficient plant operation.

(d) penalizing high load consumers by increasing the charges.

Answer: (b) load shedding.

17. Load shedding is done for

(a) reducing peak demand on the system.

(b) repairing of machines.

(c) power factor improvement.

(d) efficient operation of equipment.

Answer: (a) reducing peak demand on the system.

18. When load shedding is resorted to, it can be concluded that

(a) plant is under repair.

(b) load on the system is more than the installed capacity.

(c) both of the above (a) and (b).

(d) none of the above.

Answer: (b) load on the system is more than the installed capacity.

19. Generators for base load plants are usually designed for maximum efficiency around

(a) 20% over-load.

(b) full-load.

(c) 75% full-load.

Answer: (b) full-load.

20. Generators for power plants to supply exclusively peak loads are usually designed for maximum efficiency to occur at

(a) full load.

(b) 50 - 75% full load.

(c) 25 - 50% full load.

(d) 10% full load.

Answer: (b) 50 - 75% full load.

21. A pilot exciter is provided on synchronous generator to

(a) provide starting torque to the generator.

(b) to supplement the power generated by the main generator.

(c) excite the main exciter.

(d) none of the above.

Answer: (c) excite the main exciter.

22.Annual operating cost of a generating plant consists of

(a) fixed charges.

(b) semi-fixed charges.

(c) operating or running charges.

(d) all of the above.

Answer: (d) all of the above.

23. For a power plant the expenditure on which of the following items is expected to be almost negligible ?

(a) Publicity.

(b) Taxes.

(c) Insurance.

(d) Maintenance.

Answer: (a) Publicity.

24. In a power plant which of the following items does not fall in the category of operating cost ?

(a) Salaries of operational and maintenance staff.

(b) Maintenance and repair cost.

(c) Salaries of supervisory staff engaged on the running of the plant.

(d) Salaries of management and clerical staff.

Answer: (d) Salaries of management and clerical staff.

25. In a power plant, which of the following items fall in the category of semi-fixed charges ?

(a) Annual interest and depreciation on capital cost.

(b) All types of taxes and insurance charges.

(c) Salaries of management and clerical staff.

(d) All of the above.

Answer: (d) All of the above.

26. For a nuclear power plant, the useful life is expected to be about

(a) 10 years.

(b) 30 years.

(c) 60 years.

(d) 80 years.

Answer: (b) 30 years.

27. The interest on the capital cost is included in

(a) annual fixed cost.

(b) annual operating cost.

(c) both (a) and (b).

(d) neither (a) nor (b).

Answer: (a) annual fixed cost.

28. The capital cost of a 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.

Answer: (c) total installed capacity and number of units as well.

29. The long term load forecast is required for

(a) operation of plant.

(b) economic operation of plant.

(c) planning the addition in generation capacity.

(d) both (b) and (c).

Answer: (c) planning the addition in generation capacity.

30. The annual depreciation reserve depends on

(a) capital cost only.

(b) salvage value only.

(c) on the method of calculation depreciation reserve.

(d) all of the above.

Answer: (d) all of the above.

31. Salvage value of a plant

(a) is always positive.

(b) is always zero.

(c) is always negative.

(d) may be any of the above.

Answer: (d) may be any of the above.

32. An equipment purchased for Rs 25 lakhs, 3 years before, has now market value of 32 lakhs, It shows that

(a) the value has depreciated as per straight line method.

(b) the value has depreciated as per diminishing value method.

(c) the value has depreciated as per sinking fund method.

(d) the value has appreciated with the time.

Answer: (d) the value has appreciated with the time.

33. Ideally depreciated value of the plant plus the accumulation in the depreciation fund should be equal to

(a) obsolescence rate.

(b) sinking fund.

(c) original invested value.

(d) salvage value.

Answer: (c) original invested value.

34. In a straight line method, annual depreciation charges are calculated by

(a) the capital cost minus salvage value divided by the number of years of life.

(b) the capital cost divided by the number of years of life.

(c) making a provision for setting each year a fixed rate, first applied to the original cost and then to the diminishing value, depending upon the useful life of the plant.

(d) none of the above.

Answer: (a) the capital cost minus salvage value divided by the number of years of life.

35. Anneal installment towards depreciation increases with the decrease in interest rate in case of

(a) straight line depreciation.

(b) sink fund depreciation.

(c) reducing balance depreciation.

(d) all of the above.

Answer: (b) sink fund depreciation.

36. Annual depreciation of the plant is proportional to the earning capacity of the plant in case of

(a) straight line depreciation.

(b) sinking fund depreciation.

(c) reducing balance depreciation.

(d) none of the above.

Answer: (c) reducing balance depreciation.

37. Annual estimated depreciation charges for a plant are heavy during early years in case of

(a) diminishing value method.

(b) sinking fund method.

(c) straight line method.

(d) none of the above.

Answer: (a) diminishing value method.

38. In a power plant insurance cover is provided for

(a) equipment only.

(b) unskilled workers only.

(c) unskilled and skilled workers.

(d) equipment and skilled and unskilled workers.

Answer: (d) equipment and skilled and unskilled workers.

39. A company can raise funds through

(a) fixed deposits.

(b) shares.

(c) bonds.

(d) any of the above.

Answer: (d) any of the above.

40. All of the following are the sources of borrowing money except

(a) shares.

(b) debentures.

(c) bonds.

(d) fixes deposits.

Answer: (a) shares.

41. Which of the following are not repayable after a stipulated period ?

(a) Fixed deposits.

(b) Shares.

(c) Bonds.

(d) Cash certificates.

Answer: (b) Shares.

42. During summer season load on the system increases, this is due to

(a) increase in demand of water supply.

(b) increased business activity.

(c) increased use of fans, air coolers and air conditioners.

(d) vacations in schools and institutions.

Answer: (c) increased use of fans, air coolers and air conditioners.

43. The connected load of a domestic consumer (medium income group) is usually about

(a) 2 - 5 kW

(b) 10 - 20 kW

(c) 20 - 30 kW

(c) below 1 kW

Answer: (a) 2 - 5 kW

44. Power demand can be estimated approximately by

(a) load survey method.

(b) mathematical method.

(c) statistical method.

(d) economic parameters.

(e) all of the above.

Answer: (c) statistical method.

45. A load curve is a plot of

(a) load versus duration of time.

(b) load versus current.

(c) load versus time.

(d) total number of units generated versus time.

Answer: (c) load versus time.

46. The chronological load curve indicates

(a) variation in demand factor during 24 hours.

(b) variation in demand from instant to instant during 24 hours.

(c) the total energy consumed up to different times of the day.

(d) the total number of hours for which a particular load lasts during the day.

Answer: (b) variation in demand from instant to instant during 24 hours.

47. The area under the load curve represents

(a) system voltage.

(b) current.

(c) energy consumed.

(d) maximum demand.

(e) average demand.

Answer: (c) energy consumed.

48. The area under daily load curve divided by 24 gives

(a) average load for the day.

(b) maximum demand.

(c) connected load.

(d) demand factor.

Answer: (a) average load for the day.

49. Which of the following statements regarding load curve is true ?

(a) The area under the curve gives average demand.

(b) The ratio of area under the load curve to the total area of the rectangle in which it is contained gives the load factor for the day.

(c) The area of the load curve divided by the number of hours gives the load factor.

(d) The area of the load curve divided by the number of hours gives the demand factor.

Answer: (b) The ratio of area under the load curve to the total area of the rectangle in which it is contained gives the load factor for the day.

50. Load curve of a power generating station is of always

(a) negative slope.

(b) zero slope.

(c) positive slope.

(d) any combination of (a), (b) and (c).

Answer: (d) any combination of (a), (b) and (c).

51. Load curve helps in deciding the

(a) total installed capacity of the plant.

(b) size of the generating units.

(c) operating schedule of the generating units.

(d) all of the above.

Answer: (d) all of the above.

52. Load duration curve gives

(a) the variations of load during different hours of the day.

(b) average load.

(c) the number of hours for which a particular load lasts during the day.

(d) none of the above.

Answer: (c) the number of hours for which a particular load lasts during the day.

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

(a) rectangular shape.

(b) triangular shape.

(c) L - shape.

(d) I - shape.

Answer: (a) rectangular shape.

54. The mass curve represents

(a) average load.

(b) the total energy consumed by the load up to a particular time in a day.

(c) the number of hours for which a particular load lasts during the day.

(d) the variation of load during different hours of the day.

Answer: (b) the total energy consumed by the load up to a particular time in a day.

55. 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.

56. Integrated load duration curve representing total number of units (kWh) generated for a given demand in kW can be plotted directly from

(a) load curve.

(b) load duration curve.

(c) mass curve.

(d) any of these.

Answer: (b) load duration curve.

57. In a load duration curve for an integrated power system, the uppermost crest represents the energy contributed by which one of the following?

(a) Base power stations.

(b) Major thermal stations.

(c) Peaking hydro or gas turbine stations.

(d) Non-conventional power stations.

Answer: (d) Non-conventional power stations.

58. During which season the load on a power system is maximum ?

(a) Autumn.

(b) Rainy.

(c) Summer.

(d) Winter.

Answer: (d) Winter.

59. Maximum demand on the power system is

(a) the greatest of all 'short time interval averaged' demand during a period.

(b) instantaneous maximum value of kW supplied during a period.

(c) instantaneous maximum value of kVA supplied during a period.

(d) maximum value of units (kWh) supplied during a period.

Answer: (a) the greatest of all 'short time interval averaged' demand during a period.

60. The power system experiences peak demand from

(a) midnight to 8 A.M.

(b) 8 A.M. to 2 P.M.

(c) 2 P.M. to 6 P.M.

(d) 6 P.M. to 10 P.M.

Answer: (d) 6 P.M. to 10 P.M.

61. Connected load means

(a) installed electrical load in the premises of a consumer.

(b) maximum load a consumer draws.

(c) load drawn by consumer at any instant.

(d) none of the above.

Answer: (a) installed electrical load in the premises of a consumer.

62. The maximum demand of a power station is

(a) sum of the maximum demands of all its consumers.

(b) greatest average load in a specified time.

(c) peak value of load in a specified time.

(d) all of the above.

Answer: (b) greatest average load in a specified time.

63. Demand factor is defined as the ratio of

(a) average load to maximum demand.

(b) maximum demand to connected load.

(c) connected load to maximum demand.

(d) maximum demand to average load.

Answer: (b) maximum demand to connected load.

64. Demand factor on a power system is

(a) always greater than unity.

(b) normally greater than unity.

(c) always lesser than unity.

(d) normally lesser than unity.

Answer: (c) always lesser than unity.

65. The load factor is equal to

(a) average load/peak load.

(b) peak load/average load.

(c) average load/connected load.

(d) average load/base load.

Answer: (a) average load/peak load.

66. A power station's plant load factor is defined as the ratio of

(a) the energy generated to that of maximum energy that could have been generated.

(b) average load to peak load.

(c) minimum load to peak load.

(d) minimum load to average load.

Answer: (b) average load to peak load.

67. Load factor of a power plant is

(a) generally equal to unity.

(b) always less than unity.

(c) always more than unity.

(d) normally more than unity.

Answer: (b) always less than unity.

68. The load factor for domestic loads may be taken as

(a) about 85%

(b) 50 - 60%

(c) 25 - 50%

(d) 10 - 15%

Answer: (d) 10 - 15%

69. Load factor for heavy industries may be taken as

(a) 70 - 80%

(b) 40 - 50%

(c) 25 - 40%

(d) 20 - 25%

Answer: (a) 70 - 80%

70. The annual load duration curve of a power supply system may be considered as a straight line from 40 MW to 8 MW. The load factor of the system is

(a) 20%

(b) 40%

(c) 60%

(d) 83.33%

(e) none of the above.

Answer: (c) 60%

71. An industrial consumer has a load pattern of 2,000 kW 0.8 lag for 12 hours and 1,000 kW unity power factor for 12 hours. The load factor is

(a) 0.5

(b) 0.75

(c) 0.6

(d) 2.0

Answer: (b) 0.75

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

(a) 25%

(b) 50%

(c) 62.5%

(d) 75%

Answer: (c) 62.5%

73. Diversity factor is the ratio of

(a) sum of maximum demands of consumers ÷ system maximum demand.

(b) maximum demand of consumers ÷ average demand.

(c) demand of all consumers ÷ average demand.

(d) none of the above.

Answer: (a) sum of maximum demands of consumers ÷ system maximum demand.

74. The daily energy produced in thermal power station is 720 MWh at a load factor of 0.6. What is the maximum demand of the station?

(a) 50 MW

(b) 30 MW

(c) 72 MW

(d) 720 MW

Answer: (b) 30 MW

75. Diversity factor in a power system is

(a) always less than unity.

(b) normally less than unity.

(c) always more than unity.

(d) normally more than unity

Answer: (c) always more than unity.

76. Diversity factor x maximum demand is

(a) average demand.

(b) sum of consumer's maximum demands.

(c) installed capacity.

(d) generated power.

Answer: (b) sum of consumer's maximum demands.

77. Diversity factor has direct effect on

(a) fixed cost per unit generated.

(b) operating cost per unit generated.

(c) both (a) and (b).

(d) neither (a) nor (b).

Answer: (a) fixed cost per unit generated.

78. The knowledge of diversity factor helps in computing

(a) plant capacity.

(b) average load.

(c) units (kWh) generated.

(d) peak demand.

Answer: (a) plant capacity.

79. Plant capacity factor is

(a) actual energy produced ÷ maximum possible energy that could have been produced (based on installed capacity).

(b) actual energy produced ÷ plant capacity hours for which the plant has been in operation.

(c) energy generated in a given period ÷ (maximum demand x hours of operation in given period).

(d) none of the above.

Answer: (a) actual energy produced ÷ maximum possible energy that could have been produced (based on installed capacity).

80. Utilization factor is defined as the ratio of

(a) average demand to rated capacity of the power plant.

(b) maximum demand on the power plant to the rated capacity of the power plant.

(c) rated capacity of the power plant to the maximum demand.

(d) none of the above.

Answer: (b) maximum demand on the power plant to the rated capacity of the power plant.

81. Capacity factor will be very low when the power plant

(a) is operated as base load plant.

(b) is operated for supplying base loads as well as peak loads.

(c) is operated hi emergency only.

(d) is under maintenance.

Answer: (c) is operated hi emergency only.

82. A thermal generating station has an installed capacity of 15 MW and supplies a daily load of 10 MW for 12 hours and 5 MW of remaining 12 hours. The plant capacity factor for this station is

(a) 1

(b) 0.75

(c) 0.67

(d) 0.5

Answer: (d) 0.5

83. A generating station has a maximum demand of 30 MW, a load factor of 60% and a plant capacity factor of 50%. The reserve capacity of the plant is

(a) 5 MW

(b) 4 MW

(c) 6 MW

(d) 10 MW

Answer: (c) 6 MW

84. If the rated plant capacity and maximum load of a power station are equal then

(a) load factor is unity.

(b) capacity factor is unity .

(c) utilization factor is unity.

(d) load factor and capacity factor are equal.

(e) both (c) and (d).

Answer: (e) both (c) and (d).

85. Spinning reserve is

(a) the reserve generating capacity which is available for service but not in operation.

(b) the reserve generating capacity which is connected to the bus and is ready to take load.

(c) the reserve generating capacity which is in operation but is not in service.

(d) none of the above.

Answer: (b) the reserve generating capacity which is connected to the bus and is ready to take load.

86. The power which must be available ever under emergency conditions is known as

(a) spinning reserve.

(b) cold reserve.

(c) firm reserve.

(d) hot reserve.

Answer: (c) firm reserve.

87. In a power plant, a reserve generating capacity which is in operation but not in service, in called the

(a) cold reserve.

(b) hot reserve.

(c) spinning reserve.

(d) firm reserve.

Answer: (b) hot reserve.

88. A power plant has a maximum demand of 15 MW. The load factor is 50% and the plant factor is 40%. The operating reserve is

(a) 3 MW

(b) 3.75 MW

(c) 6 MW

(d) 7.5 MW

Answer: (b) 3.75 MW

89. Which of the following relations holds good ?

(a) Maximum demand = Connected load x demand factor.

(b) Average load = Maximum load x load factor.

(c) Capacity factor = Utilization factor x load factor.

(d) All of the above.

Answer: (d) All of the above.

90. Two areas 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.

(d) maximum demand of A may be more or less than that of B.

Answer: (c) maximum demand of B would be more than that of A.

91. 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

Answer: (a) reduces the installation cost.

92. As the load factor of a generating plant increases, the generation cost per kWh generated

(a) decreases.

(b) increases.

(c) remains same.

(d) none of these.

Answer: (a) decreases.

93. In order to have a lower cost of electrical energy generation

(a) the load factor and diversity factor should be low.

(b) the load factor should be low but diversity factor should be high.

(c) the load factor should be high but the diversity factor should be low.

(d) the load factor and diversity factor should be high.

Answer: (d) the load factor and diversity factor should be high.

94. In a power station, the cost of generation of power reduces most effectively when

(a) diversity factor alone increases.

(b) both diversity factor and load factor increase.

(c) load factor alone increases.

(d) both diversity factor and load factor decrease

Answer: (b) both diversity factor and load factor increase.

95. The economics of power plant is greatly influenced by:

1.load factor 2. utilization factor 3. unit capacity 4. type of load

(a) 1, 2, 3 and 4.

(b) 1, 3 and 4.

(c) 1, 2 and 3.

(d) 2, 3 and 4.

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

96. Flat rate tariff can be charged on the basis of

(a) connected load.

(b) units consumed.

(c) maximum demand.

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

Answer: (b) units consumed.

98. Domestic consumers are usually charged

(a) flat demand tariff.

(b) block rate tariff.

(c) flat rate tariff.

(d) off peak tariff.

Answer: (b) block rate tariff.

99. If the tariff for electrical energy charges provides incentive by way of reduced charges for higher consumption, then it may be concluded that the

(a) load factor is high.

(b) power factor is high.

(c) plant has sufficient reserve capacity.

(d) power is generated through hydropower plant.

Answer: (c) plant has sufficient reserve capacity.

100. Two part tariff is charged on the basis of

(a) connected load.

(b) units consumed.

(c) maximum demand.

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

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

101. Block rate tariff, where energy charge decreases with the increase in energy consumption,

(a) encourages the consumers for more consumption.

(b) discourages the consumers for more consumption.

(c) encourages the consumers to restrict their demands.

(d) encourages the consumers to improve the power factor.

Answer: (a) encourages the consumers for more consumption.

102. The penalty for low power factor is imposed on

(a) residential and commercial consumers.

(b) industrial consumers.

(c) agricultural consumers.

(d) all of the above.

Answer: (b) industrial consumers.

103. Doherty rate tariff is applied to

(a) domestic consumers.

(c) bulk supplies.

(b) medium industrial consumers.

(d) municipal loads.

Answer: (c) bulk supplies.

104. Maximum demand tariff is generally not applied to the domestic consumers owing to their

(a) low maximum demand.

(b) low load factor.

(c) low power factor.

(d) low energy consumption.

Answer: (a) low maximum demand.

105. Low power factor is usually not due to

(a) discharge lamps.

(b) incandescent lamps.

(c) arc lamps.

(d) induction furnaces.

Answer: (b) incandescent lamps.

106. The primary reason for low power factor is owing to installation of

(a) synchronous motors.

(b) dc motors.

(c) induction motors.

(d) commutator motors.

Answer: (c) induction motors.

107. Low power factor has the drawback(s) of

(a) increased transmission and distribution losses.

(b) poor voltage regulation.

(c) high cost of equipment for a given load.

(d) all of the above.

Answer: (d) all of the above.

108. The low power factor of an industrial plant is uneconomical for

(a) electric supply utility only.

(b) owner of the plant only.

(c) both the owner of the plant and the electric supply utility.

(d) either (a) or (b).

Answer: (c) both the owner of the plant and the electric supply utility.

109. For a consumer the most economical power factor is usually

(a) 0.25 - 0.5 lagging.

(b) 0.25 - 0.5 leading.

(c) 0.85 - 0.95 lagging.

(d) 0.85 - 0.95 leading.

Answer: (c) 0.85 - 0.95 lagging.

110. Power factor can be improved by using

(a) static capacitors.

(b) synchronous condensers.

(c) phase advancers.

(d) all of the above.

Answer: (d) all of the above.

111. Static capacitors are rated in terms of

(a) kVAR

(b) kW

(c) kVA

(d) kWh

Answer: (a) kVAR

112. For power factor improvement static capacitors have the advantage(s) of

(a) small losses.

(b) easy installation.

(c) low initial cost and little maintenance.

(d) all of the above.

Answer: (d) all of the above.

113. For power factor improvement static capacitors have the drawback(s) of

(a) short-service life.

(b) getting damaged by high voltage.

(c) not repairable.

(d) all of the above.

Answer: (d) all of the above.

114. For power factor improvement synchronous condensers have the drawback(s) of

(a) comparatively higher maintenance and operating costs.

(b) requirement of auxiliary equipment for their starting.

(c) possibility of falling out of synchronism causing in interruption of supply.

(d) all of the above.

Answer: (d) all of the above.

115. Advantages of the improved power factor are

(a) increase in operating efficiency of the power system.

(b) improvement in voltage regulation.

(c) reduction in overall cost per unit.

(d) better utilization of kW capacities of prime movers, transformers, switchgear and the lines.

Answer: (d) better utilization of kW capacities of prime movers, transformers, switchgear and the lines.

116. The most suitable location for a power factor improvement device is

(a) near the electrical appliance which is responsible for the poor power factor.

(b) at the receiving end, in case of a transmission line.

(c) at the sending end.

(d) any where in the circuit.

(e) both (a) and (b).

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

118. An industrial installation has a power factor of 0.8 lagging. It would be economical to improve pf to

(a) unity.

(b) about 0.8 leading.

(c) about 0.95 lagging.

(d) about 0.95 leading.

Answer: (c) about 0.95 lagging.

119. A 3-phase, 11 kV, 50 Hz, 200 kW load has a power factor of 0.8 lag. A delta-connected 3-phase capacitor is used to improve the pf to unity. The capacitance per phase of the capacitor in micro-farads is

(a) 3.948

(b) 1.316

(c) 0.439

(d) 11.844 [GATE E.E. 1999]

Answer: (b) 1.316

120. The most economical limit of power factor correcting is governed by

(a) original power factor.

(b) relative costs of the supply and power factor correction equipment.

(c) both (a) and (b).

(d) none of the above.

Answer: (b) relative costs of the supply and power factor correction equipment.

121. There is a limit beyond which it is not economical still further to improve the power factor in order to meet the increased demand on the generating station. The maximum value to which the pf can be economically raised entirely depends upon

(a) the cost of the power factor correction equipment.

(b) the cost of the generating plant.

(c) the relative costs of the generating plant and phase advancing plant.

(d) none of the above.

Answer: (c) the relative costs of the generating plant and phase advancing plant.