**Synchronous Generators**

**1.** In an alternator, voltage drops occurs in

(A) armature resistance only

(B) armature resistance and leakage reactance

(C) armature resistance, leakage reactance and armature reaction

(D) armature resistance, leakage reactance, armature reaction and earth connections.

**2.**The magnitude of various voltage drops that occur in an alternator, depends on

(A) power factor of the load

(B) load current

(C) power factor x load current

(D) power factor x (load current)2.

**3.** In an alternator, at lagging power factor, the generated voltage per phase, as compared to that at unity power factor

(A) must be same as terminal voltage

(B) must be less than the terminal voltage

(C) must be more than the terminal voltage

(D) must be 1.41 time the terminal voltage.

**4.** The power factor of an alternator depends on

(A) Load

(B) Speed of rotor

(C) Core losses

(D) Armature losses.

5. Which kind of rotor is most suitable for turbo alternators which arc designed to run at high speed ?

(A) Salient pole type

(B) Non-salient pole type

(C) Both (A) and (B) above

(D) None of the above.

**6.** Salient poles are generally used on

(A) high speed prime movers only

(B) medium speed prime movers only

(C) low speed prime movers only

( D) low and medium speed prime movers.

**7.** The frequency of voltage generated in an alternator depends on

(A) number of poles

(B) rotative speed

(C) number of poles and rotative speed

(D) number of poles, rotative speed and type of winding.

**8.** The frequency of voltage generated by an alternator having 8 poles and rotating at 250 rpm is

(A) 60 Hz

(B) 50 Hz

(C) 25 Hz

(D) 16 2/3 Hz.

**9.** An alternator is generating power at 210 V per phase while running at 1500 rpm. If the need of the alternator drops to 1000 rpm, the generated voltage per phase will be

(A) 180 V

(B) 150 V

(C) 140 V

(D) 105 V.

**10.** A 10 pole AC generator rotates at 1200 rpm. The frequency of AC voltage in cycles per second will be

(A)120

(B) 110

(C) 100

(D) 50.

**11**. The number of electrical degrees passed through in one revolution of a six pole synchronous alternator is

(A)360:

(B)720

(C) 1080

(D)2160 .

**12.** Fleming's left hand rule may be applied to an electric generator to find out

(A) direction of rotor rotation

(B) polarity of induced emf

(C) direction of induced emf

(D) direction of magnetic field.

**13.** If the input to the prime mover of an alternator is kept constant but the excitation is changed, then the

(A) reactive component of the output is changed

(B) active component of the output is changed

(C) power factor of the load remains constant

(D) power factor of the load reduces.

**14.** An alternator is said to be over excited when it is operating at

(A) unity power factor

(B) leading power factor

(C) lagging power factor

(D) lagging to leading power factor.

**15.** When an alternator is running on no load the power supplied by the prime mover is mainly consumed

(A) to meet iron losses

(B) to meet copper losses

(C) to meet all no load losses

(D) to produce induced emf in armature winding.

**Answers:**

**1.C ----- 2.B ----- 3.C ----- 4.A ----- 5.B ----- 6.D ----- 7.C ----- 8.D -----9.C -----10.C -----11.C ----- 12.C -----13.A -----14.C ----- 15.C**

**16.** As the speed of an alternator increases

(A) the frequency increases

(B) the frequency decreases

(C) the frequency remains constant but power factor decreases

(D) none of the above.

**17.** For an alternator when the power factor of the load is unity

(A) the armature flux will have square waveform

(B) the armature flux will be demagnetising

(C) the armature flux will be cross-magnetising

(D) the armature flux will reduce to zero.

**18.** The driving power from the prime mover driving the alternator is lost but the alternator remains connected to the supply network and the field supply also remains on. The alternator will

(A) get burnt

(B) behave as an induction motor but will rotate in the opposite direction

(C) behave as a synchronous motor and will rotate in the same direction

(D) behave as a synchronous motor but will rotate in a reverse direction to that corresponding to generator action.

**19.** If the input of the prime mover of an alternator is kept constant but the excitation is changed, then

(A) the active component of the output is changed

(B) the reactive component of the output is changed

(C) power factor of the load remains constant

(D) power factor of the load changes from lagging to leading.

**20.**For 50 Hz system the maximum speed of an alternator can be

(A) approximately 3600 rpm

(B) approximately 3000 rpm

(C) 3600 rpm

(D) 3000 rpm.

**21.** Voltage characteristic of an alternator is shown in figure. Which curve represents the characteristics for leading power factor ?



(A) A

(B) B

(C) C

(D) D.

**22.** In the above figure, the characteristic for unity power factor is represented by the curve maked

(A) A

(B) B

(C)C

(D )D.

**Questions 23 to 26 refer to the following data:**

In a 50 kVA, star connected 440 V, 4-phase 50 Hz alternator, the effective armature resistance is 0.25 ohm per phase. The synchronous reactance is 3.2 ohm per phase and leakage reactance is 0.5 ohm per phase.

**23.** Full load output current at unity power factor will be

(A) 65.6 A

(B) 55.4 A

(C) 45.6 A

(D) 35.4 A.

**24.** Full load line voltage will be

(A) 500 V

(B) 471 V

(C) 450 V

(D) 435 V.

**25.** No load line voltage will be

(A) 600 V

(B) 599 V

(C)592V

(D) 580 V.

**26.** Percentage regulation of the alternator is approximately

(A) 55%

(B) 45%

(C) 35%

(D) 25%.

**27.** In order that two alternators be put in parallel, which of the following factors should be identical for both ?

(A) Voltage

(B) Frequency

(C) Phase sequence

(D) All of the above.

**28.** When two alternators are running in parallel, their RKVA load share is changed by changing their ................ while their kW load share is changed by changing their ..............

(A) excitation, driving torque

(B) driving torque, excitation

(C) excitation, excitation

(D) driving torque, driving torque.

**29.** Two-alternators are running in parallel. If the driving force of both the alternators is changed, this will result in change is

(A) frequency

(B) back emf

(C) generated voltage

(D) all of the above.

**30.** A three phase alternator has a phase sequence of RYB for its three output voltages. In case the field current is reversed, the phase sequence will become

(A) RBY

(B) RYB

(C) YRB

(D) none of the above.

**Answers:**

**16.A ----- 17.C ----- 18.C ----- 19.B ----- 20.D ----- 21.D ----- 22.C ----- 23.A -----24.B -----25.C ----- 26.D ----- 27.D -----28.A -----29.A ----- 30.B**

**31.** The armature reaction of an alternator influences

(A) windage losses

(B) operting speed

(C) generated voltage per phase

(D) waveform of voltage generated.

**32.** For the same power rating, a lower voltage alternator will be

(A) more efficient

(B) larger in size

(C) operating at high rpm

(D) more costly.

**33.** An alternator is supplying 10A to an inductive load at 220 V, while running at 1000 rpm. Now if the speed of the alternator is reduced to 750 rpm but the field current remains unchanged, the load current will become

(A) 18 A

(B) 13.3 A

(C) 10 A

(D) 7.5 A.

**34.** Dampers in a large generator

(A) increase stability

(B) reduce voltage fluctuations

(C) reduce frequency fluctuations.

**35.** An alternator is rated for 75 kW at 0.8 power factor. It means that

(A) alternator has 4 poles

(B) alternator can supply 75 kW at 0.8 power factor

(C) alternator can supply power only to loads having power factor 0.8 only

(D) the peak efficiency of alternator occurs only at 75 kW load having 0.8 lagging power factor.

**36.** The regulation of an alternator is

(A) the reduction in terminal voltage when alternator is loaded

(B) the variation of terminal voltage under the conditions of maximum and minimum excitation

(C) the increase in terminal voltage when load is thrown off

(D) the change in terminal voltage from lagging power factor to leading power factor.

**37.** A magnetisation curve represents the relationship between

(A) reactive and non-reactive components of voltage

(B) exciting currents and terminal voltage

(C) power factor and terminal voltage

(D) magnetic flux and armature current.

**38.** In an alternator if the armature reaction produces demagnetisation of the main field, the power factor should be

(A) Zero, lagging load

(B) Zero, leading load

(C) Unity.

**39.** In an alternator if the armature reaction produces magnetisation of the main field the power factor should be

(A) Zero, lagging load

(B) Zero, leading load

(C) Unity.

**40.** When an alternator is supplying unity power factor load, the armature reaction will produce

(A) magnetisation of the main field

(B) demagnetisation of the main field

(C) distortion of the main field.

**41.** An alternator has full load regulation of 4% when the power factor of the load is 0.8 lagging while alternator runs at 1500 rpm. The full load regulation of 1400 rpm for 0.8 pf lagging load will be

(A) 15/14 x 4 percent

(B) 14/15 x 4 percent

(C) 4 percent

(D) Depends on other factors also.

**42.** The Potier's triangle separates the

(A) iron losses and copper losses

(B) field mmf and armature mmf

(C) stator voltage and rotor voltage

(D) armature leakage reactance and armature reaction mmf.

**43.** In the Potier's triangle, the Potier reactance drop per phase is 22 volts per phase at 88 amperes per phase. The Potier's reactance per phase is

(A) 0.22

(B) 0.25

(C) 0.30

(D) 0.44.

**44.** Two alternators are running in parallel. The excitation of one of the alternator is increased. The result will be

(A) machine with excess excitation will burn

(B) both machines will start vibrating

(C) power output will decrease

(D) wattless component will change.

**45.** The power output of an alternators is 100 kW. In order that the tangent of pf angle may be 0.8 lagging, the KVAR rating must be

(A) 80 cosφ KVAR

(B) 80 sin φ KVAR

(C) 80 KVAR

(D) -80 KVAR.

**Answers:**

**31.C ----- 32.B ----- 33.C ----- 34.A ----- 35.B ----- 36.C ----- 37.B ----- 38.A ----- 39.A ----- 40.C -----41.C ----- 42.D -----43.B -----44.D ----- 45.D**

**46.** The power output of an alternator is 40 kW and KVAR component is - 25. What will be the value of tanφ (φ being the power factor angle) ?

(A) 0.625 lagging

(B) 0.625 leading

(C) 0.375 lagging

(D) 0.375 leading.

**47.** When short pitch coils of 160 are used in an alternator, which harmonic component will not be present in the output emf ?

(A) third

(B) fifth

(C) seventh

(D) ninth.

**48.** A 120 MW turbo alternator is supplying power to 80 MW load at p.f. lagging. Suddenly the steam supply to the turbine is cut off and the alternator remains connected to the supply network and the field supply also remains on. What will happen to the alternator ?

(A) The stator winding of the alternator will get burnt

(B) The rotor winding of the alternator will get burnt

(C) The alternator will continue to run as a synchronous motor rotating in the same direction

(D) The alternator will continue to run as a synchronous motor rotating in the opposite direction.

**49.** The figure shows the characteristics of an alternator. Which curve represents synchronous impedance ?



(A) curve A

(B) curve B

(C) curve C

(D) curve D.

**50.** In the above figure (Figure of Question 49) which curve represents short circuit ?

(A) curve A

(B) curve B

(C) curve C

(D) curve D.

**51.** In the above figure which curve represents open circuit voltage ?

(A) curve A

(B) curve B

(C) curve C

(D) curve D.

**52.** For a peripheral speed of 314 m/s, a 2 pole cylindrical machine will have maximum diameter of

(A) 255 cm

(B) 235 cm

(C) 200 cm

(D) 170 cm.

**53.** The rotor of the salient pole alternator has 24 poles. The number of cycles of emf in one revolution would be

(A) 24

(B) 12

(C) 6

(D) 4.

**54.** Two alternators A and B are sharing an inductive load equally. If the excitation of alternator A is increased

(A) alternator B will deliver more current and alternator A will deliver less current

(B) alternator B will deliver less current and alternator A will deliver more current

(C) both will continue to share load equally

(D) both will deliver more current.

**55.** Desirable feature for the parallel operation of two alternators is

(A) both should have same resistance

(B) both should have same reactance

(C) both should have less of resistance as compared to synchronous reactance

(D) both should have more of resistance as compared to synchronous reactance.

**56.** Alternators used in aircraft systems usually have frequency of

(A) 25 Hz

(B) 50 Hz

(C) 100 Hz

(D) 400 Hz.

**57.** High frequency on aircraft alternators is selected in order to

(A) free the systems from external disturbance

(B) compensate for high speeds

(C) compensate for high altitudes

(D) reduce the bulk.

**58.** A 20 pole ac generator rotates at 600 rpm. The periodic time of current in seconds per cycle is

(A) 0.009

(B) 0.004

(C) 0.008

(D) 0.01.

**59.** What kind of rotor is most suitable for turbo alternators ?

(A) salient pole type

(B) non-salient pole type

(C) both (A) and (B) above

(D) none of the above.

**60.**The synchronizing power developed in one of the alternators, when two alternators are running in parallel, will load the same alternator in which it is developed and reduce its speed

(A) True

(B) False

**Answers:**

**46.B ----- 47.D ----- 48.C ----- 49.A ----- 50.C ----- 51.D ----- 52.C ----- 53.B ----- 54.B ----- 55.C ----- 56.D ----- 57.D ----- 58.D ----- 59.B ----- 60.A**

**61.** If the input to the prime mover of an alternator is kept constant but the excitation is changed then the

(A) reactive component of the output is changed

(B) active component of the output is changed

(C) power factor of load remains constant.

**Get Answer:** ([Show](http://www.electricalquizzes.com/Synchronous_Generator/Synchronous_Generator_MCQs_5.htm))

**62.** If two machines are running in synchronism and the voltage of one machine is suddenly increased

(A) the machines will burn

(B) both machines will stop

(C) synchronising torque will be produced to restore further synchronism.

**63.** In an alternator, at 0.8 lagging power factor, the generated voltage per phase is 240 V to give a rated terminated voltage ' V '. If the power factor of load increases to unity, the generated voltage per phase must be

(A) 260 V

(B) 250 V

(C) 240 V

(D) 225 V.

**64.** The advantage of salient poles in an alternator is

(A) reduce noise

(B) reduced windage loss

(C) adoptability to low and medium speed operation

(D) reduce bearing loads and noise.

**65.** Magnetisation curves for no load and full load unity power factor are shown in figure below. Which is the magnetisation curve for full load 0.8 power factor ?



(A) curve A

(B) curve B

(C) curve C

(D) curve D.

**66.** At a particular instant a turbo alternator is generating 80 MW at 0.8 power factor lagging. Now if the steam supply valve to the steam turbine is further opened and the excitation is not changed

(A) the speed of the alternator will increase but kW delivered will remain unchanged

(B) the speed of the alternator will increase and kW delivered will also increase

(C) the speed of the alternator will remain unchanged but it can meet more kW demand

(D) the speed of the alternator will remain unchanged but it will deliver more kVA.

**67.** Two alternators A and B are sharing a resistive load (p.f. = 1 ) equally. Now if the excitation of alternator A is increased

(A) alternator A will become lagging and alternator B will become leading

(B) alternator A will become leading and alternator B will become lagging

(C) both alternators will continue to operate on unity power factor

(D) both alternators will operate on lagging power factor

(E) both alternators will operate on leading power factor.

**68.** The advantage of providing damper winding in alternators is

(A) elimination of harmonic effects

(B) provide a low resistance path for the currents due to unbalancing of voltage

(C) oscillations are provided when two alternators operate in parallel

(D) all of the above.

**69.** When two alternators are running in exactly synchronism, the synchronising power wil be

(A) zero

(B) sum of the output of two

(C) unity

(D) 0.707.

**Questions 70 to 72 refer to the figure given below :**



**70.** Load characteristic curves for an alternator are shown. The curves are drawn for 0.8 pf lagging, 0.8 p.f. leading, 0.7 p.f. leading and 0.9 p.f. lagging. Which curve represents the characteristics for 0.8 p.f. leading ?

(A) curve A

(B) curve B

(C) curve C

(D) curve D.

**71.** Which curve represents the data for 0.8 p.f. lagging ?

(A) curve A

(B) curve B

(C) curve C

(D) curve D.

**72.** Which curve represents the data for 0.9 p.f. lagging ?

(A) curve A

(B) curve B

(C) curve C

(D) curve D.

**73.** The balanced short circuit current of a three phase alternator is 25 amperes at 1500 rpm. For the same field current, the balanced short current at 1400 rpm will be

(A)18 A

(B) 27 A

(C) 20 A

(D) 20\*(2)1/2A

**74.** A three phase alternator has a phase sequence of RYB for its three output voltages, for clockwise rotation. Now if the alternator is rotated anticlockwise, the phase sequence will be

(A) RYB

(B) RBY

(C) BYR

(D) none of the above.

**75.** In a synchronous machine, if the field flux axis is ahead of the armature field axis, in the direction of rotation, the machine working as

(A) asynchronous motor

(B) asynchronous generator

(C) synchronous motor

(D) synchronous generator.

**Answers:**

**61.A ----- 62.C ----- 63.D ----- 64.C ----- 65.D ----- 66.C ----- 67.A ----- 68.D ----- 69.A ----- 70.C ----- 71.A ----- 72.B -----73.C ----- 74.B ----- 75.D**

**76.** In synchronous alternator, which of the following coils will have emf closer to sine waveform ?

(A) concentrated winding in full pitch coils

(B) concentrated winding in short pitch coils

(C) distributed winding in full pitch coils

(D) distributed winding in short pitch coils.

**77.** An alternator has rated field current of 4 A. The alternator develops 180 V while drawing a field current of 2 A at 750 rpm. If the field current is made 4 A at 750 rpm generated voltage could be

(A) 400 V

(B) 380 V

(C) 60V

(D) 330 V.

**78.** The armature reaction of an alternator will be completely magnetizing in case the load power factor is

(A) unity

(B) 0.707

(C) zero lagging

(D) zero loading.

**79.** Which of the following is not an integral part of synchronous generator system ?

(A) prime mover

(B) distribution transformer

(C) excitation system

(D) protection system.

**80.** For turbo generators the range of excitation voltage is

(A) 10 to 20 V

(B) 30 to 100 V

(C) 100 to 800 V

(D) 1000 to 1800 V.

**81.** In case of low speed hydrogenerators, the short circuit ratio is usually

(A) 0.1 to 0.5

(B) 0.5 to 0.6

(C) 0.6 to 1.0

(D) 1.0 to 1.5.

**82.** The permissible duration for which a generator of rated frequency 50 Hz can run at 46 Hz is

(A) zero

(B) one cycle

(C) one second

(D) one minute.

**83.** The permissible duration in supply . frequency is

(A) ± 2 %

(B) ± 5 %

(C) ± 10 %

(D) ± 25 %.

**84.** The regulation of an alternator is likely to be negative in case of

(A) high speed alternators

(B) slow speed alternators

(C) lagging power factor of the load

(D) leading power factor of the load.

**Questions 85 to 88 refer to the data given below:**

A phase, 50 Hz, 6600 V, alternator is rated at 6600 kW at 0.8 power factor and a full load efficiency of 90%.

**85.** kVA is rating of the alternator is

(A) 750 kVA

(B) 7500 kVA

(C) 75000 kVA

(D) 750000 kVA.

**86.** The current rating of the alternator is

(A) 65.63 A

(B) 656.3 A

(C) 6563 A

(D) 65630 A.

**87**. The input to the alternator is

(A) 666.6 kW

(B) 6666 kW

(C) 66660 kW

(D) 666,600 kW.

**88.** If the input. to an alternator remains unaltered, but excitation is changed then which of the following will not change ?

(A) kVA output

(B) kW output

(C) power factor

(D) all of the above.

**89.** Which of the following method is likely to give the voltage regulation more than the actual value ?

(A) Synchronous reactance method

(B) MMF method

(C) Zero power factor method

(D) None of the above.

**90.** The effect of cross magnetization in an alternator field is to make the output

(A) true sinusoidal

(B) non-sinusoidal

(C) harmonic free

(D) none of the above

**Answers:**

**76.D ----- 77.D ----- 78.D ----- 79.B ----- 80.C ----- 81.D ----- 82.C ----- 83.A ----- 84.D ----- 85.B ----- 86.C ----- 87.B ----- 88.B ----- 89.A ----- 90.B**

**91.** In order to reduce the harmonics in the emf generated in an alternator

(A) slots are skewed

(B) salient pole tips are chamfered

(C) winding is well distributed

(D) all of the above.

**92.** The maximum power in a synchronous machine is obtained when the load angle is

(A) 0°

(B) 85°

(C) 120°

(D) 135°.

**93.** The emf generated due to nth harmonic component of flux in an alternator will be

(A) n times the fundamental emf

(B) same as fundamental emf

(C) less than the value of fundamental emf.

**94.** Synchronizing torque comes into operation under all of the following cases EXCEPT

(A) phase difference between two voltages

(B) frequency difference between two voltages

(C) voltage difference between two voltages

(D) reduction in exciting current in one of the alternators.

**95.** Unbalanced 3-phase stator currents cause

(A) double frequency currents in the rotor

(B) healing of rotor

(C) vibrations

(D) all of the above.

**96.** In large generators protection provided against external faults is

(A) biased differential protection

(B) sensitive earth fault protection

(C) inter-turn fault protection

(D) all of the above.

**97.** Pitch factor is the ratio of the emfs of

(A) short pitch coil to full pitch coil

(B) full pitch winding to concentrated winding

(C) full pitch winding to short pitch winding

(D) distributed winding to full pitch winding.

**98**. In an alternator if the winding is short pitched by 50 electrical degrees, its pitch factor will be

(A) 1.0

(B) 0.866

(C) 0.75

(D) 0.50.

**99.** The Potier's triangle separates

(A) stator losses and rotor losses

(B) fixed losses and variable losses

(C) armature voltage and field voltage

(D) armature leakage reactance and armature reaction mmf.

**100.** If a single phase alternator has 8 slots per pole uniformly speed, but the winding is arranged with the middle two left empty, the breadth coefficient will be

(A) 0.99

(B) 0.88

(C) 0.67

(D) 0.53.

**101.** Two alternators are running in parallel. If the field of one of the alternator is adjusted, it will

(A) reduce its speed

(B) change its load

(C) change its power factor

(D) change its frequency.

**102.** A generator is operating by itself supplying the system loads. The reactive power supplied by the generator will

(A) depend on prime mover rpm

(B) depend on type of insulation used

(C) depend on the amount demanded by the load

(D) depend on inter-coil inductance.

**103.** Which of the following part plays important role in over speed protection of a generator ?

(A) Over current relay

(B) Alarm

(C) Differential protection

(D) Governor.

**104.** Which type of protection is provided on a generator to protect against stator insulation failure ?

(A) Differential protection

(B) Thermocouple actuated alarm

(C) Over current relay

(D) Reverse power relay.

**105.** Which relays comes into operation in the event of the failure of prime mover connected to ihe generator ?

(A) Reverse power relay

(B) Differential relay

(C) Buchholz relay

(D) None of the above.

**Answers:**

**91.D ----- 92.B ----- 93.C ----- 94.D ----- 95.D ----- 96.D ----- 97.A ----- 98.B ----- 99.D -----100.D -----101.C ----- 102.C -----103.D -----104.A ----- 105.A**

**106.** In alternators, the distribution factor is defined as the ratio of emfs of

(A) distributed winding to connected winding

(B) full pitch winding to distributed winding

(C) distributed winding to full pitch winding

(D) concentrated winding to distributed winding.

**107.** One of the advantages of distributing the winding in alternator is to

(A) reduce noise

(B) save on copper

(C) improve voltage waveform

(D) reduce harmonics.

**108.** In case of a uniformly distributed winding, the value of distribution factor is

(A) 0.995

(B) 0.80

(C) 0.75

(D) 0.50.

**109.** The advantage of a short pitch winding is

(A) low noise

(B) increased inductance

(C) suppression of harmonics

(D) reduced eddy currents.

**110.** Two alternators are connected in parallel. Their kVA and kW load share can be changed by changing respectively their

(A) driving torque and excitation

(B) excitation and driving torque

(C) excitations only

(D) driving torques only.

**111.** In case of alternators, the dark and bright lamp method is used for

(A) phase sequence

(B) load balancing

(C) synchronizing

(D) load transfer.

**112.** The advantage of using short pitched windings in an alternator is that it

(A) suppresses the harmonics in generated emf

(B) reduces the total voltage around the armature coils

(C) saves copper used in windings

(D) improves cooling by better circulation of air.

**113.** For the same power rating, an alternator operating at lower voltage will be

(A) less noisy

(B) costlier

(C) larger in size

(D) more efficient.

**114.** Which of the following is the common synchronous speed in rpm between 60 Hz and 50 Hz alternators ?

(A) 900

(B) 600

(C) 375

(D) 225.

**115.** All of the following losses for a synchronous machine are fixed EXCEPT

(A) Bearing friction loss

(B) Copper loss

(C) Windage loss

(D) Core loss.

**116.** Salient pole type rotors as compared to cylindrical pole type are

(A) smaller in diameter and larger in axial length

(B) larger in diameter and smaller in axial length

(C) larger in diameter as well as axial length

(D) small in diameter as well as axial length.

**117.** In a synchronous machine, the field flux axis is ahead of the armature field axis in the direction of rotation, the machine is working as

(A) asynchronous alternator

(B) asynchronous motor

(C) synchronous motor

(D) synchronous alternator.

**118.** Which of the following is not a common synchronous speed in rpm between a 50 Hz and 25 Hz alternator ?

(A) 750

(B) 375

(C) 250

(D) 200.

**119.** The effective voltage in one phase of an alternator having 240 turns per phase, frequency of 60 Hz and flux per pole of 2.08 x 106 lines will be

(A) 332.5 V

(B) 665 V

(C) 1330 V

(D) 2660 V.

**120.** The maximum current that can be supplied by an alternator depends on

(A) speed of the exciter

(B) number of poles

(C) exciter current

(D) strength of the magnetic field.

**Answers:**

**106.A ----- 107.C ----- 108.A ----- 109.C ----- 110.B ----- 111.C ----- 112.B ----- 113.C ----- 114.B ----- 115.B -----116.B ----- 117.D -----118.D -----119.C ----- 120.D**

**121.** The windings for an alternator are

I. 36 slots, four poles, span 1 to 8

II. 72 slots, six poles, span 1 to 10

III. 96 slots, six poles, span 1 to 12.

The windings having pitch factors of more than 0.9 are

(A) I and II only

(B) II and III only

(C) I and II only

(D) I, II and III.

**Questions 122 to 124 refer to data given below:**

A 500 kVA ,2300 volt three phase star connected alternator has a full load armature-resistance drop per phase of 50 volts and a combined armature reactance plus armature-reaction drop of 500 volts per phase

**122.** The percent regulation of the alternator at unity power factor is

(A) 1.05

(B) 10.5

(C) 21.5

(D) 27.5.

**123.** The percent regulation of the alternator at 0.866 power factor lagging is

(A) 26.3

(B) 20.1

(C) 16.6

(D) 10.5.

**124.** The percent regulation of the alternator at 0.8 power factor leading is

(A) 13.2

(B) 26.4

(C) - 26.4

(D) - 13.2.

**125.** The imaginary or fictitious part of synchronous reactance takes care of

(A) armature reaction

(B) voltage regulation

(C) inductive reactance

(D) none of the above.

**126.** In an alternator, the use of short pitch coils of 160° will indicate the absence of

(A) third harmonic

(B) fifth harmonic

(C) seventh harmonic

(D) ninth harmonic.

**127.** When a generator designed for operation at 60 Hz is operated at 50 Hz

(A) operating voltage must be derated to (50/60) of its original value

(B) operating voltage must be derated to (50/60)2 of its original value

(C) kVA rating can be upgraded to (60/50) of the rated value

(D) the generator will not take any load.

**128.** Overheating of generator's winding

(A) reduces generated voltage

(B) reduces power factor

(C) reduces life of the machine

(D) does not have any significant effect.

**129.** Rotor shaft of 500 MW alternator is supported in

(A) ball bearings

(B) roller bearings

(C) needle bearings

(D) journal bearings.

**130.** The voltage of field system for an alternator is usually

(A) less than 200 V

(B) between 200 V and 440 V

(C) 400 V

(D) more than 1 kV.

**131.** Maximum electric power output of a synchronous generator is

(A) Xs/ VtEf

(B) V2t/ Xs

(C) E2f/ Xs

(D) VtEf/ Xs

**132.** The electrical angle between the field axis and axis of armature reaction of a loaded synchronous generator with armature current lagging behind the excitation emf by ψ is

(A) ψ - 90

(B) ψ + 90

(C) 90 - ψ

(D) ψ + 180.

**133.** Two synchronous generators G1and G2 are equally sharing the KVAR of the load while operating in parallel. Keeping the terminal voltage fixed in order to shift part of the KVAR load from G2 to G1

(A) The field current of G1 is lowered

(B) The field current of G2 is raised

(C) The field current of G1 is raised and of G2 lowered

(D) The field current of G1 is lowered and of G2 is raised.

**134.** A synchronous generator is operating with excitation adjusted for unity power factor current at constant load. When on increasing the excitation the power factor

(A) will lag

(B) will lead

(C) will become zero

(D) none of the above.

**135.** On changing the speed of an alternator from 4000 rpm to 2000 rpm, the generated emf phase will become

(A) 1/4

(B) 1/2

(C)1/3

(D)1/5

**Answers:**

**121.A ----- 122.B ----- 123.A ----- 124.D ----- 125.A ----- 126.D ----- 127.A ----- 128.C ----- 129.D -----130.A -----131.D ----- 132.B -----133.C -----134.A ----- 135.B**

**136.** Zero power factor method of an alternator is used to find its

(A) field resistance

(B) armature resistance

(B) armature resistance

(C) efficiency

(D) voltage regulation.

**137.**The power factor of an alternator is obtained from its

(A) excitation

(B) speed

(C) load

(D) none of the above.

**138.** For parallel operation, alternators must have

(A) same speed

(B) same kVA rating

(C) same voltage rating

(D) none of the above.

**139.** For alternation having fractional pitch of 5/6 the coil span is

(A)90°

(B)120°

(C)150°

(D)180°

**140.** Fractional pitch to eliminate 7th harmonic from alternator emf is

(A) 7/6

(B) 6/7

(C) 6/5

(D) 3/5.

**141.** Consider the following statements about a three-phase synchronous generator synchronized to an infinite bus when its mechanical input is increased gradually with field current held constant:

1. The power factor of the current supplied becomes more lagging.

2. The power factor of the current supplied improves.

3. The power factor remains unity.

4. The load angle is increased.

Of these statements

(A) 1 alone is correct

(B) 2 alone is correct

(C) 2 and 4 are correct

(D) 3 and 4 are correct.

**142.** A 3-phase synchronous generator, with its armature resistance and the leakage reactance being neglected, is synchronized to an infinite bus and its field excitation is kept constant thereafter. Now the machine is loaded by Supplying mechanical input to the shaft so that the load-angle δ reaches a value of 60° Under this condition, the operating power-factor would be

(A) 0.866 leading

(B) 0.866 lagging

(C) 0.5 leading

(D) 0.5 lagging.

**143.**A round rotor synchronous generator has a leakage reactance of 10%, armature reaction reactance of 90% and negligible armature resistance. With the machine initially running at rated speed and terminal voltage of 1.0 p.u., a 3-phase short-circuit is applied. The sustained armature current will be

(A) 1.25 p.u.

(B) 1.11 p.u.

(C) 1.0 p.u.

(D) 0.9 p.u.

**144.** Following a sudden short-circuit at the terminals of a 3-phase unloaded synchronous generator, the initial effect of the pole-face damper windings, is to

(A) establish the armature flux through the direct-axis magnetic circuit of the machine

(B) allow only partial linkage of the armature flux with the main field winding

(C) confine the armature flux to completely link the damper winding

(D) repel the armature flux and confine it to the leakage flux path in the air-gap.

**145.** In a synchronous generator operating at zero pf lagging, the effect of armature reaction is

(A) magnetizing

(B) demagnetizing

(C) cross-magnetizing

(D) both magnetizing and cross-magnetizing.

**146.** Which of the following limit the reactive power output of a synchronous generator ?

1. Armature current

2. Field current

3. Load angle

4. Prime mover input.

Select the correct answer using the codes given below:

Codes

(A) land 2

(B) 2 and 3

(C) 3 and 4

(D) land 4.

**147.** The steady-state stability limit of a synchronous generator can be increased by

(A) an increase in its reactance

(B) an increase in the excitation of the machine

(C) a decrease in the moment of inertia of the machine

(D) an increase in the moment of intertia of the machine.

**Answers:**

**136.D ----- 137.C ----- 138.C ----- 139.C ----- 140.B ----- 141.B ----- 142.B ----- 143.B ----- 144.B -----145.B -----146.B ----- 147.B**

## Synchronous Motors

**1.** Synchronous motor can operate at

(A) Lagging power factor only

(B) Leading power factor only

(C) Unity power factor only

(D) Lagging, leading and unity power factor only.

**2.** An unexcited single phase synchronous motor is

(A) reluctance motor

(B) repulsion motor

(C) universal motor

(D) AC series motor.

**3.** The maximum power developed in the synchronous motor will depend on

(A) rotor excitation only

(B) maximum value of coupling angle

(C) supply voltage only

(D) rotor excitation supply voltage and maximum value of coupling angle.

**4.** In case the field of a synchronous motor is under excited, the power factor will be

(A) leading

(B) lagging

(C) zero

(D) unity.

**5.** A synchronous motor is switched on to supply with its field windings shorted on themselves. It will

(A) not start

(B) start and continue to run as an induction motor

(C) start as an induction motor and then run as synchronous motor

(D) bum immediately.

**6.** When the excitation of an unloaded salient pole synchronous motor gets disconnected

(A) the motor will bum

(B) the motor will stop

(C) the motor will ran as a reluctance motor at the same speed

(D) the motor will run as a reluctance motor at a lower speed.

**7.** The damping winding in a synchronous motor is generally used

(A) to provide starting torque only

(B) to reduce noise level

(C) to reduce eddy currents

(D) to prevent hunting and provide the starting torque.

**8.** The back emf set up in the stator of a synchronous motor will depend on

(A) rotor speed only

(B) rotor excitation only

(C) rotor excitation and rotor speed

(D) coupling angle, rotor speed and excitation.

**9.** A synchronous motor is a useful industrial machine on account of which of the following reasons ?

I. It improves the power factor of the complete installation

II. Its speed is constant at all loads, provided mains frequency remains constant

III. It can always be adjusted to operate at unity power factor for optimum efficiency and economy.

(A) I only

(B) II only

(C) III only

(D) I, II and III.

**10.** Which of the following is an unexcited single phase synchronous motor ?

(A) A.C. series motor

(B) Universal motor

(C) Reluctance motor

(D) Repulsion motor.

**11.** An over excited synchronous motor draws current at

(A) lagging power factor

(B) leading power factor

(C) unity power factor

(D) depends on the nature of load.

**12.** With the increase in the excitation current of synchronous motor the power factor of the motor will

(A) improve

(B) decrease

(C) remain constant

(D) depend on other factors.

**13.** The armature current of a synchronous motor has large values for

(A) low excitation only

(B) high excitation only

(C) both low and high excitation

(D) depends on other factors.

**14.** A synchronous motor is switched on to supply with its field windings shorted on themselves. It will

(A) not start

(B) start and continue to run as an induction motor

(C) start as induction motor and then run as a synchronous motor.

**15.** If the field of a synchronous motor is under excited, the power factor will be

(A) lagging

(B) leading

(C) unity.

**Answers:**

**1.D ----- 2.A ----- 3.D ----- 4.B ----- 5.C ----- 6.B ----- 7.D ----- 8.B -----9.D -----10.C -----11.B ----- 12.A -----13.C -----14.C ----- 15.A**

**16.** When the excitation of an unloaded salient-pole synchronous motor suddenly gets disconnected

(A) the motor stops

(B) it runs as a reluctance motor at the some speed

(C) it runs as a reluctance motor at a lower speed.

**17.** The armature current of the synchronous motor has large values for

(A) low excitation only

(B) high excitation only

(C) both high and low excitation.

**18.** What is the ratio of no load speed to full load speed of a 200 kVA, 12 pole, 2200 V, 3 phase, 60 Hz synchronous motor ?

(A) 1

(B) 1.1

(C) 1.21

(D) infinite.

**19.** If a synchronous motor drops too far behind, the power it takes from the supply also increases too much, and the armature tries to get accelerated, until it is in correct position. Sometimes, some motor overshoots the marks and then the process of acceleration-retardation continues. This phenomenon is known as

(A) synchronization

(B) hunting

(C) pulling out

(D) swinging.

**20.** The maximum value of torque that a synchronous motor, can develop without losing its synchronism, is known as

(A) breaking torque

(B) synchronizing torque

(C) pull out torque

(D) slip torque.

**21.** In a synchronous motor if the back emf generated in the armature at no load is approximately equal to the applied voltage, then

(A) the torque generated is maximum

(B) the excitation is said to be zero percent

(C) the excitation is said to be 100%

(D) the motor is said to be fully loaded.

**22.** A synchronous motor is connected to supply voltage V drawing current /. Resultant of v and back emf Eb is represented by E in the figure. From this diagram it can be concluded that



(A) power factor it lagging

(B) the resultant of V and Eb is consumed by synchronous impedance

(C) current I leads the applied voltage by I

(D) motor is running on full load.

**23.** A 3 phase, 400 V, 50 Hz salient pole synchronous motor is fed from an infinite bus and is running at no load. Now if the field current of the motor is reduced to zero

(A) the motor will stop

(B) the motor will run

(C) the motor will run at synchronous speed

(D) the motor will run at less than synchronous speed.

**24.** The purpose of embedding the damper winding in the pole face is to

(A) eliminate hunting and provide adequate starting torque

(B) reduce windage losses

(C) eliminate losses on account of air friction

(D) reduce bearing friction.

**25.** A synchronous motor is switched on to supply with its field windings shorted on themselves. It will

(A) not start

(B) start but continue to run as an induction motor

(C) start as an induction motor and then run as a synchronous motor.

**26.** In case of a synchronous motor we have

I. Load

II. Speed

III. DC excitation.

The magnitude of stator back emf depends on

(A) I only

(B) I and II only

(C) III only

(D) I, II and III.

**27.** Which of the following motors is non-self starling ?

(A) squirrel cage induction motor

(B) wound rotor induction motor

(C) synchronous motor

(D) DC series motor.

**28.** The back emf in the stator of a synchronous motor depends on

(A) speed of rotor

(B) rotor excitation

(C) number of poles

(D) flux density.

**29.** Which motor can conveniently operate on lagging as well as leading power factor ?

(A) squirrel cage induction motor

(B) wound rotor induction motor

(C) synchronous motor

(D) any of the above.

**30.** A synchronous motor working on leading power factor and not driving any mechanical, is known

(A) synchronous induction motor

(B) spinning motor

(C) synchronous condenser

(D) none of the above.

**Answers:**

**16.A ----- 17.C ----- 18.A ----- 19.B ----- 20.B ----- 21.C ----- 22.B ----- 23.C -----24.A -----25.B ----- 26.C ----- 27.C -----28.B -----29.C ----- 30.C**

**31.** The constant speed of a synchronous motor can be changed to new fixed value by

(A) changing the applied voltage

(B) interchanging any two phases

(C) changing the load

(D) changing the frequency of supply.

**32.** A 3 phase, 400 V, 50 Hz synchronous motor is operating at zero power factor lagging with respect to the excitation voltage. The armature reaction mmf. produced by the armature current will be

(A) demagnetizing

(B) magnetizing

(C) cross-magnetizing

(D) none of the above.

**33.** In a synchronous motor, the torque angle is

(A) the angle between the rotating stator flux and rotor poles

(B) the angle between magnetizing current and back emf

(C) the angle between the supply voltage and the back emf

(D) none of the above.

**34.** A 3 phase, 400 V, 50 Hz, 4 pole synchronous motor has a load angle of 10° electrical. The equivalent mechanical degrees will be 35.

(A) 10°

(B)5√2 degrees

(C) 5 degrees

(D) 1 degree.

**35.** A 3 phase, 400 V, 50 Hz synchronous motor has fixed excitation. The load on the motor is doubled. The torque angle, φi will become nearly

(A) φr /2

(B) φr

(C)2 φr

(D) √ 2 φr

**36.** The hunting in a synchronous motor takes place when

(A) friction in bearings is more

(B) air gap is less

(C) load is variable

(D) load is constant.

**37.** V curves for a synchronous motor represent relation between

(A) field current and speed

(B) field current and power factor

(C) power factor and speed

(D) armature current and field current.

**38.** The breakdown. torque of a synchronous motor varies as

(A)1 /(applied voltage )

(B) 1/(applied voltage )2

(C) applied voltage

(D) (applied voltage)2.

**39.** Hunting in a synchronous motor cannot be due to

(A) variable frequency

(B) variable load

(C) variable supply voltage

(D) windage friction.

**40.** When the excitation of an unloaded salient pole synchronous motor suddenly gets disconnected

(A) the motor stops

(B) it runs as a reluctance motor at the same speed

(C) it runs at a reluctance motor at a lower speed.

**41.** Which synchronous motor will be smallest in size ?

(A) 5 HP, 500 rpm

(B) 5 HP, 375 rpm

(C) 10 HP, 500 rpm

(D) 10 HP, 375 rpm.

**42.** A synchronous machine has its field winding on the stator and armature winding on the rotor. Under steady running conditions, the air-gap field

(A) rotates at synchronous speed with respect to stator

(B) rotates at synchronous speed with direction of rotation of the rotor

(C) remains stationary with respect to stator

(D) remains stationary with respect to rotor.

**43.** If the field of a synchronous motor is under-excited, the power factor will be

(A) unity

(B) lagging

(C) leading

(D) more than unity.

**44.** The name plate of an induction motor reads 3 phase. 400 V, 50 Hz. 0.8 of lagging, 1440 rpm. On similar lines the name plate of a synchronous motor should read

(A) 3 phase, 400 V, 50 Hz, 0.8 pf lagging, 1500 rpm

(B) 3 phase, 400 V. 50 Hz, 0.8 pf leading, 1500 rpm

(C) 3 phase, 400 V, 50/60 Hz, 0.8 pf lagging, 1500 rpm

(D) 3 phase. 400 V, 50/60 Hz, 0.8 pf leading, 1500 rpm.

**45.** In which coil the emf generated will be more, for given flux distribution and number of turns

(A) Full pitch coil

(B) Short pitch coil

(C) Long pitch coil

(D) Equal emf will be generated in all cases.

**Answers:**

**31.D ----- 32.B ----- 33.A ----- 34.C ----- 35.C ----- 36.C ----- 37.D ----- 38.C ----- 39.D ----- 40.A -----41.B ----- 42.C -----43.B -----44.B ----- 45.A**

**46.** In a synchronous motor which loss does not vary with load ?

(A) Copper losses

(B) Hysteresis losses

(C) Windage losses

(D) None of the above.

**47.** In a 3-phase. 400 V, 50 Hz salient pole synchronous motor, the maximum power is obtained when the load angle is

(A) 45°

(B) less than 90°

(C) 90°

(D) more than 90°.

**48.** A high starting torque synchronous motor has

(A) simplex rotor

(B) phase wound damper

(C) five slip rings

(D) all of the above.

**49.** In a three phase synchronous motor, the magnitude of field flux

(A) varies with speed

(B) varies with load

(C) remains constant at all loads

(D) varies with power factor.

**50.** The parameter connected with the operation of a synchronous motor are

I. Speed

II. Power factor

III. Armature current.

When the excitation of the motor is varied, which parameters vary along with it

(A) I only

(B) II only

(C) II and III only

(D) I, II and III.

**51.** A 3 phase, 400 V, 50 Hz salient pole synchronous motor is running on no load. If there is break in the excitation winding of the motor

(A) the motor will stop

(B) the winding will get overheated

(C) the motor will run as reluctance motor at the rated rpm

(D) the motor will run as reluctance motor at lower rpm.

**52.** In the figure shown with curve represents the variation of synchronous reactance for a synchronous motor with field current ?



(A) curve A

(B) curve B

(C) curve C

(D) curve D.

**53.** A synchronous motor is said to be 'floating' when it operates

(A) on no load and without losses

(B) on constantly varying load

(C) on pulsating load

(D) on high load and variable supply voltage.

**54.** The negative phase sequences in a three phase synchronous motor exist when

(A) motor is overloaded

(B) motor is under loaded

(C) unbalanced voltage is supplied

(D) motor armature is hot.

**55.** The field winding of a synchronous motor is shorted. A variable voltage is now supplied to the stator. The result will be

(A) stator winding will bum

(B) motor will not run

(C) motor will rotate at synchronous speed on light load

(D) motor will rotate at a speed which is less than the synchronous speed.

**56.** In a three phase synchronous motor, the poles

(A) are along the resultant air-gap flux wave φ r

(B) arc opposite to φ r

(C) lag φ r

(D) lead φ r

**57**. A 3 phase synchronous motor is running clockwise. In case the direction

of its field current is reversed

(A) the motor will continue to run in the same direction

(B) the motor will run in the reverse direction

(C) the motor will stop

(D) the winding of the motor will burn.

**58.** The speed regulation of a 3 phase synchronous motor is

(A) 5%

(B) 1%

(C) 0.4%

(D) zero.

**59.** When E is the supply voltage and R is the rotor resistance per phase,

the mechanical power develop by a synchronous motor per phase is given

by

(A) V2R

(B) V2/2R

(C) V2/4R

(D) 2V/3R

**60.** In a synchronous motor, the synchronizing power comes into action

when

(A) rotor speed is equal to synchronous speed

(B) rotor speed is less than synchronous speed

(C) rotor speed is more than synchronous speed

(D) rotor speed is either less or more than synchronous speed.

**Answers:**

**46.C ----- 47.B ----- 48.D ----- 49.C ----- 50.C ----- 51.A ----- 52.D ----- 53.A ----- 54.C ----- 55.D ----- 56.C ----- 57.A ----- 58.D ----- 59.C ----- 60.D**

**61**. The size of a synchronous motor decreases with the increase in

(A) speed

(B) horse power rating

(C) flux density

(D) all of the above.

**62.** The flux density used in synchronous motor is around

(A) 0.05 to 0.46 wb/m2

(B) 0.5 to 0.6 wb/m2

(C) 5 to 6 wb/m2

(D) 50 to 60 wb/m2.

**63.** In a synchronous motor if the saturation is neglected, then the short

circuit ratio (SCR) will be related to the synchronous reactance (xd) as

(A) SCR

(B) SCR = (xd)2

(C) SCR = 1/ (xd)2

(D) SCR = 1/ (xd).

**64.** In synchronous motor out of the following losses, which one will have

the highest proportion ?

(A) Stator copper losses

(B) Friction and windage losses

(C) Eddy current losses

(D) Iron losses.

**65.** Which of the following losses is not dissipated by the stator core

surface in a synchronous motor ?

(A) Copper losses in the slot portion of the conductors

(B) Eddy current losses in the conductors

(C) Iron losses in the stator

(D) Windage losses.

**66.** The speed of a synchronous motor

(A) reduces as load increases

(B) increases as load increases

(C) adjusts itself to new equilibrium speed whenever load changes

(D) always remains constant.

**67.** Which of the following devices can be used as a phase advancer ?

(A) 3 phase induction motor squirrel cage type

(B) 3 phase induction motor-slip ring type

(C) Synchronous motor working at leading power factor

(D) Synchronous motor working at lagging power factor.

**68.** When a synchronous motor is connected to an infinite bus, while

operating on leading power factor .

(A) the excitation voltage will be less than the supply voltage

(B) the excitation voltage will be more than the supply voltage

(C) the excitation voltage will be equal to the supply voltage

(D) the excitation voltage will be independent of the supply voltage.

**69.** In a synchronous motor

(A) total number of rotor slots = total number of stator slots

(B) total number of rotor slots is more than total number of stator slots

(C) total number of rotor slots is less than the total number of stator slots.

**70.** In a synchronous motor during hunting if the rotor speed becomes more than the synchronous speed

(A) negative phase sequence currents are generated

(B) harmonics are developed in the armature circuit

(C) damper bars develop induction generator torque

(D) field excitation increases.

**71.** If a synchronous motor fails to pull into synchronism after applying dc field current, the probable clause may be

(A) high core losses

(B) low field current

(C) high field current

(D) low short circuit ratio.

**72.** In case of a 3 phase synchronous motor, maximum speed variation is

(A) 10%

(B) 5%

(C) 3%

(D) zero.

**73.** The synchronous motors are not self-starting because

(A) stator is not used

(B) starting winding is not provided

(C) the direction of instantaneous torque on the rotor reverses after half cycle

(D) there is no slip.

**Questions 74 to 75 refer to the Figure.**



**74.** In the figure above, the curves for leading power factors are

(A) A and B

(B) C and D

(C) On left of line XY

(D) On right of line XY

**75.** In the curves represent characteristics for 0, 10, 20 and. 30 kW, not necessarily in that order, then curve for 0 kW is expected to be

(A) A

(B)B

(C) C

(D) D.

**Answers:**

**61.C ----- 62.B ----- 63.D ----- 64.D ----- 65.D ----- 66.D ----- 67.C ----- 68.B ----- 69.C ----- 70.C ----- 71.B ----- 72.D -----73.C ----- 74.D ----- 75.D**

**76.** The curve for 20 k W is expected to be



(A) A

(B) B

(C) C

(D) D.

**77.** In a synchronous motor hunting can be minimized

(A) by using damper bars

(B) by using a flywheel

(C) by designing the motor for adequate synchronizing power

(D) by any of the above methods.

**78.** A three phase 400 V, 50 Hz synchronous motor is working at 50 percent load. In case an increase in the field current of the motor causes a reduction in the armature current, it can be concluded that

(A) the motor is delivering reactive power to the mains

(B) the motor is absorbing reactive power to the mains

(C) the motor is neither absorbing nor delivering reactive power.

**79.** Inverted V-curves for a synchronous motor show

(A) Variation of power factor with dc field current when load on the motor remains constant

(B) Variation of field current and supply voltage when excitation remains constant

(C) Variation of power factor and supply voltage when motor is hunting

(D) none of the above.

**80.** The armature current of the synchronous motor has large values for

(A) low excitation only

(B) high excitation only

(C) both low and high excitation.

**81.** In which range the cost of a synchronous motor can be comparable to the cost of a induction motor ?

(A) Low HP high speed

(B) High HP low speed

(C) High HP high speed

(D) Low HP low speed.

**82.** Insulation resistance test on synchronous motor can be conducted to measure which of the following resistances ?

(A) Stator winding to earthed frame

(B) Rotor winding to earthed shaft

(C) Phase to phase winding resistance

(D) All of the above.

**83.** Which curve represents the open circuit characteristic of a synchronous motor



(A) Curve A

(B) Curve B

(C) Curve C

(D) Curve D.

**84.** During short circuit test which of the following is short circuited ?

(A) Armature terminals

(B) One of the phase windings of stator

(C) AH phase windings of stator

(D) All phase windings of stator and armature.

**85.** The duration of sudden short circuit test on a synchronous motor is usually

(A) about one second

(B) about one minute

(C) about one hour

(D) 40 minutes.

**86.** The maximum torque which a synchronous will develop at rest for any angular positions of the rotor, at rated stator supply voltage and frequency, is known as

(A) Reluctance torque

(B) Synchronous torque

(C) Locked-rotor torque

(D) Pull up torque.

**87.** The maximum constant load torque under which a synchronous motor will pull into synchronism at rated rotor supply voltage and frequency is known as

(A) Synchronous torque

(B) Pull in torque

(C) Pull up torque

(D) Pull out torque.

**88.** The maximum sustained torque which a synchronous motor will develop at synchronous speed for 1 mm with rated frequency and rated field current is known as

(A) Pull out torque

(B) Reluctance torque

(C) Synchronous torque

(D) Average torque.

**89.** The total steady state to drive synchronous motor and the load at synchronous speed is known as

(A) Synchronous torque

(B) Asynchronous torque

(C) Reluctance torque

(D) Pull-up torque.

**90.** The space angle between the axis of the stator revolving magnetic field and the rotor-pole axis, both looked and running at synchronous speed, is known as

(A) angle of lead

(B) power angle

(C) power factor angle

(D) reactive power angle.

**Answers:**

**76.A ----- 77.D ----- 78.B ----- 79.A ----- 80.C ----- 81.B ----- 82.D ----- 83.A ----- 84.A ----- 85.A ----- 86.C ----- 87.B ----- 88.A ----- 89.A ----- 90.B**

**91.** In a synchronous machine in case the axis of field flux is in line with the armature flux, then

(A) the machine is working as synchronous motor

(B) the machine is working as synchronous generator

(C) the machine is said to be floating

(D) the machine will vibrate violently.

**92.** If other factors remain constant, the speed of a synchronous motor in its operating (and load) range is correctly described by which of the following ?

(A) The speed varies directly only in proportion to the number of its poles

(B) The speed is independent of the frequency of the voltage supply

(C) The speed depends on the frequency of the voltage supply and the number of its poles

(D) The speed depends on the magnitude of the voltage supply and the number of its poles.

**93.** The induced emf in a synchronous motor working on leading pf will be

(A) equal to the supply voltage

(B) less than the supply voltage

(C) more than the supply voltage.

**94.** A synchronous machine with low value of short-circuit ratio has

(A) good speed regulation

(B) good voltage regulation

(C) higher stability limit

(D) lower stability limit.

**95.** While starting a synchronous motor by induction motor action, very high emf is induced in the field. This induced emf may damage the insulation of the field winding and of slip rings. The insulation damage can φ be prevented by

(A) short-circuiting the field winding by field discharge resistance

(B) splitting the field winding into several sections

(C) either of (A) or (B) above

(D) none of the above.

**96.** Synchronous motors, arc generally of

(A) induction type machines

(B) cylindrical pole type machines

(C) salient pole type machines

(D) hysteresis type machines.

**97.** In which of the following motor the stator and rotor magnetic fields rotate at the same speed

(A) Universal motor

(B) Reluctance motor

(C) Synchronous motor

(D) Induction motor.

**98.** Higher the applied voltage .................... will be the stator flux and ................... will be the pull in torque

(A) lower, greater

(B) greater, lower

(C) greater, greater

(D) lower, lower.

**Questions 99 to 101 refer to data given below:**

An industrial plant has a load of 1500 kVA at an average power factor of 0.6 lagging.

**99.** Neglecting all losses, the kVA input to a synchronous condenser for an overall power factor of unity will be

(A) 300 kVA

(B) 400 kVA

(C) 600 kVA

(D) 1200 kVA.

**100.** A 750 kVA synchronous condenser is used to correct the lagging power factor of the plant. The total kVA of the plant is

(A) 503

(B) 10006

(C) 2012

(D) 4024.

**101.** The overall power factor is

(A) 0.895 lagging

(B) 0.75 lagging

(C) 0.75 leading

(D) unity.

**102.** As the load is applied on a synchronous motor, its speed does not fall. The load is now supplied by

(A) decrease in back emf

(B) change in supply voltage

(C) the stator magnetic field

(D) rotor taking new angular position slightly back of its no load position.

**103.** The maximum power developed in a synchronous motor depends on all of the following EXCEPT:

(A) Supply voltage

(B) Direction of rotation

(C) Rotor excitation

(D) Maximum value of coupling angle.

**104.** In a synchronous motor, on a fixed excitation when the load is doubled, the torque angle φr will become

(A) 2 φr

(B) √2 φr

(C)φr/2

(D) φr/√2

**105.** In a synchronous motor, the armature current has the highest value when excitation is

(A) zero

(B) low

(C) high

(D) high and low.

**Answers:**

**91.C ----- 92.C ----- 93.C ----- 94.D ----- 95.C ----- 96.C ----- 97.C ----- 98.C ----- 99.D -----100.B -----101.A ----- 102.D -----103.B -----104.A ----- 105.D**

**106.** For a synchronous motor, the ratio starting torque/running torque is

(A) infinite

(B) 1.0

(C) 0.5

(D) 0.

**107.** Synchronous motors for power factor correction operate at

(A) normal load with minimum excitation

(B) normal load with zero excitation

(C) no load and greatly over-excited fields

(D) no load and under-excited fields.

**108.** The construction of a synchronous motor resembles which of the following machines?

(A) Slip ring induction motor

(B) DC shunt generator

(C) Single phase reluctance motor

(D) DC compound motor.

**109.** The construction of a synchronous motor resembles which of the following machine ?

(A) An induction motor

(B) A rotor converter

(C) An alternator

(D) A series motor.

**110.** In a synchronous motor, "hunting" may be due to variation in any of the following EXCEPT:

(A) Load

(B) Supply voltage

(C) Frequency

(D) Winding friction.

**111.** A synchronous motor is switched on to supply with its field winding short-circuited, the motor will

(A) not start

(B) bun out

(C) start and run as induction motor

(D) start as induction motor and run as synchronous motor.

**112.** In a synchronous motor, at no load, the armature current is

(A) in phase with the applied voltage

(B) leading the applied voltage by 90°

(C) lagging the applied voltage by 90°

(D) zero.

**113.** In a synchronous motor, during hunting when the rotor speed exceeds the synchronous speed

(A) field excitation increases

(B) harmonics are developed

(C) negative phase sequence currents come into action

(D) damper bars develop induction generator torque.

**114.** For a synchronous motor when V is the supply voltage, the breakdown torque will be proportional to

(A) V2

(B) V

(C) 1/ V

(D) 1/ V2

**115.** When the field winding of an unloaded salient pole synchronous motor is open - circuited, the motor will

(A) burn with dense smoke

(B) stop

(C) run as induction motor

(D) function as static condenser

**116.** In case one of the three phases of a synchronous motor is short-circuited, the motor will

(A) not start

(B) get overheated

(C) bum out

D) run normally.

**117.** The fact that a synchronous motor with salient poles will operate, even if field current is reduced to zero, can be explained by

(A) magnetization of rotor poles by stator magnetic field

(B) rotating magnetic field of the rotor

(C) rotating magnetic field of the stator

(D) interlocking action between stator and rotor fields.

**118.** The negative phase sequence in a three phase synchronous motor exists when the motor is

(A) under loaded

(B) overloaded

(C) supplied with unbalanced voltage

(D) hot.

**119.** The regulation of a synchronous motor is

(A) 0%

(B) 1%

(C) 50%

(D) 100%.

**120.** In a synchronous motor, the angle between the rotor poles and stator poles is known as

(A) synchronizing angle

(B) torque angle

(C) angle of retardation

(D) power factor angle.

**Answers:**

**106.D ----- 107.C ----- 108.B ----- 109.C ----- 110.D ----- 111.D ----- 112.B ----- 113.D ----- 114.A ----- 115.B -----116.B ----- 117.A -----118.C -----119.A ----- 120.B**

**121.** In a synchronous motor, under running conditions, the angle between the induced voltage and supply voltage will be

(A) zero

(B) between 0 and 90°

(C) between 90° and 180°

(D) more than 180°.

**122.** The rotor of a synchronous motor can only run at synchronous speed of the stator magnetic field due to

(A) Faraday's law of electro-magnetic induction

(B) Lenz's law

(C) Magnetization of rotor poles by stator magnetic field

(D) Interlocking action between stator and rotor fields.

**123.** An inverted V-curve of a synchronous motor is the variation of

(A) field current and power factor at constant load

(B) supply voltage and field current at constant excitation

(C) power factor and supply voltage during hunting

(D) supply voltage and excitation current at constant load.

**124.** Damper windings are provided on

(A) pole faces

(B) separate armature

(C) rotor shaft

(D) stator frame.

**125.** Hunting of a synchronous motor may be due to

(A) pulsations in power supply

(B) reciprocating type of load

(C) pulsating torque of driven equipment

(D) any of the above.

**126.** The V-curves of a synchronous motor show relationship between

(A) armature current and supply voltage

(B) dc field current and ac armature current

(C) excitation current and back emf

(D) none of the above.

**127.** In a synchronous motor with field under excited, the power factor will be

(A) leading

(B) lagging

(C) unity

(D) none of the above.

**128.** In a synchronous motor, maximum value of torque angle is

(A) Below 45 degrees electrical

(B) 45 degrees electrical

(C) 90 degrees electrical

(D) Above 90 degrees electrical.

**129.** In a synchronous motor, net armature voltage is of Eb and V

(A) Vector sum

(B) Vector difference

(C) Arithmetic difference

(D) Arithmetic sum.

**130.** Increasing load on a normally-excited synchronous motor, the power factor

(A) remain unchanged

(B) becomes increasing lagging

(C) becomes increasing leading

(D) none of the above.

**131.** Synchronous motor speed is controlled by varying

(A) supply voltage only

(B) supply frequency only

(C) supply voltage and frequency both

(D) none of the above.

**132.** Maximum electrical power input of a synchronous motor is

(A) (Vt Ef) / Xs

(B) V2t / Xs

(C) E2f/ Xs

(D) Xs/ (Vt Ef )

where the symbols have their usual meanings.

**133.** In a synchronous motor armature reaction at rated voltage and zero power factor leading is

(A) Magnetizing

(B) Cross magnetizing

(D) Demagnetizing

(D) None of the above.

**134.** A synchronous motor is operating with excitation adjusted for unity power factor current at constant load. On increasing the excitation, the power factor

(A) will lag

(B) will lead

(C) will become zero

(D) none of the above.

**135.** A synchronous motor is operated from a bus voltage of 1.0 pu at 1.0 pu pf leading current. The synchronous reactance is 0.5 p.u. The excitation e.m.f of the motor is

(A) 0.5

(B) 1

(C) 1.5

(D) 3.

**136.** A 3-phase synchronous motor connected to an infinite bus is operating at half full-load with normal excitation. When the load on the synchronous motor is suddenly increased

(A) its speed will first decrease and then become synchronous

(B) its speed will first increase and then become synchronous

(C) its speed will fluctuate around synchronous speed and then become synchronous

(D) its speed will remain unchanged.

**137.** A synchronous motor operating at rated voltage draws 1.0 pu current at 1.0 power factor. The machine parameters are : synchronous reactance 1.0 pu ; armature resistance, negligible. Apart from supplying this rated power, if the motor has to supply an additions! leading reactive power of 0.8 pu, then the field current has to be increased by

(A) 42%

(B) 46%

(C) 52%

(D) 60%.

**Answers:**

**121.D ----- 122.D ----- 123.A ----- 124.A ----- 125.D ----- 126.B ----- 127.B ----- 128.C ----- 129.B -----130.B -----131.C ----- 132.A -----133.C -----134.B ----- 135.C ----- 136.D ----- 137.B**