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Electrical Machines

1. The left hand rule is applicable to
 - (a) generator
 - (b) motor
 - (c) transformer
 - (d) (a) and (b) both
 - (e) (a) or (b)
2. The eddy current losses in the transformer will be reduced if
 - (a) the laminations are thick
 - (b) number of turns in the primary winding is reduced
 - (c) the number of turns in the secondary winding is reduced
 - (d) the laminations are thin
3. The speed of d.c. series motor at no load is
 - (a) zero
 - (b) 1500 r.p.m.
 - (c) infinity
 - (d) 3000 r.p.m.
 - (e) none of the above
4. A sinusoidal voltage of frequency 1 Hz is applied to the field of d.c. generator. The armature voltage will be
 - (a) 1 Hz square wave
 - (b) 1 Hz sinusoidal voltage
 - (c) d.c. voltage
 - (d) none of the above
5. The function of the commutator in a d.c. machine is
 - (a) to change alternating current to a direct current
 - (b) to improve commutation
 - (c) for easy control
 - (d) to change alternating voltage to direct voltage
6. The phase sequence of voltage generated in the alternator can be reversed by reversing its field current.
 - (a) true
 - (b) false
7. The rotation of three phase induction motor can be reversed by interchanging any two of the supply phases.
 - (a) true
 - (b) false

8. The starting torque of the three phase induction motor can be increased by
- (a) increasing the rotor reactance
 - (b) increasing the rotor resistance
 - (c) increasing the stator resistance
 - (d) none of the above
9. In the induction motor the torque is
- (a) proportional to slip
 - (b) inversely proportional to slip
 - (c) proportional to the square of the slip
 - (d) none of the above
10. The single phase induction motor (capacitor start capacitor run) basically is
- (a) single phase motor
 - (b) two phase motor
 - (c) a.c. series motor
 - (d) none of the above
11. For the equal output the total current is more in
- (a) wave winding
 - (b) lap winding
 - (c) simplex lap winding
 - (d) none of the above
12. The maximum starting torque in the induction motor is developed when
- (a) the reactance of the rotor is half of the resistance
 - (b) the reactance of the rotor is twice of the rotor resistance
 - (c) the reactance of the rotor is equal to the rotor resistance
 - (d) none of the above
13. The direction of rotation of a d.c. series motor can be changed
- (a) by interchanging supply terminals
 - (b) by interchanging field terminals
 - (c) either (a) or (b)
 - (d) none of the above
14. A d.c. shunt generator driven at a normal speed in the normal direction fails to build up armature voltage because
- (a) the resistance of armature is high
 - (b) field current is not sufficiently high
 - (c) there is no residual magnetism
 - (d) field winding has small number of turns
15. The skin effect can be reduced
- (a) by increasing the radius of the conductor
 - (b) by decreasing the radius of the conductor
 - (c) by increasing the frequency of the supply
 - (d) if the hollow conductor is used
 - (e) (b) and (d) both

- 16.** If a d.c. motor is connected across a.c. supply, the d.c. motor will
(a) burn as the eddy currents in the field produce heat
(b) run at its normal speed (c) run at a lower speed
(d) run continuously but the sparking takes place at the brushes
- 17.** What would happen if the field of d.c. shunt motor is opened ?
(a) the speed of the motor will be reduced
(b) it will continue to run at its normal speed
(c) the speed of the motor will be enormously high and might destroy itself
(d) the current in the armature will increase
- 18.** A single phase induction motor can be run on two or three phase lines.
(a) true (b) false
- 19.** What is standard direction of rotation of a motor ?
(a) clockwise when looking at the front end of the motor
(b) counter-clockwise when looking at the front end of the motor
- 20.** If the field of a synchronous motor is under excited the power factor will be
(a) lagging (b) leading
(c) unity (d) more than unity
- 21.** The rotation of wound-rotor induction motor can be reversed by
(a) transposing any two leads from the slip rings
(b) transposing any two line leads
(c) none of the above
- 22.** A split-phase motor has high starting torque.
(a) true (b) false
- 23.** The direction of rotation of a split phase motor can be reversed
(a) by reversing the leads of main winding
(b) by reversing the leads of auxiliary winding
(c) (a) and (b) both are true
(d) none of the above
- 24.** The capacitor-start motor has a high starting torque.
(a) true (b) false
- 25.** A universal motor can be run either on a.c. or d.c.
(a) true (b) false
- 26.** The phase relationship between the primary and secondary voltages of a transformer is
(a) 90 degrees out of phase (b) in the same phase
(c) 180 degrees out of phase (d) none of the above
- 27.** For point starter in the d.c. motor is used
(a) to increase the field current

- (b) to decrease the field current
 - (c) not to affect the current passing through HOLD ON coil even if any change in the field current takes place
 - (d) none of the above
28. Which of the following motor is used in the locomotives motor drives ?
- (a) A.C. series motor
 - (b) Induction motor
 - (c) D.C. series motor
 - (d) Synchronous motor
29. Which of the following motors has high starting torque ?
- (a) D.C. shunt motor
 - (b) Squirrel cage induction motor
 - (c) D.C. series motor
 - (d) A.C. series motor
30. The efficiency of d.c. shunt generator is maximum when
- (a) magnetic losses are equal to mechanical losses
 - (b) armature copper losses are equal to constant losses
 - (c) field copper losses are equal to constant losses
 - (d) stray losses are equal to copper losses
31. In the case of d.c. shunt generation, the shunt copper loss, is practically constant.
- (a) true
 - (b) false
32. Armature reaction is attributed to
- (a) the effect of magnetic field set up field current
 - (b) the effect of the magnetic field set up by armature current
 - (c) the effect of the magnetic field set up by back e.m.f.
 - (d) none of the above
33. The dummy coil in the d.c. machines is used to
- (a) eliminate armature reaction
 - (b) bring out mechanical balance of armature
 - (c) eliminate reactance voltage
 - (d) none of the above
34. Equilizer rings in the d.c. generator (lap winding) are used
- (a) to avoid unequal distribution of current at the brushes thereby helping to get sparkless commutation
 - (b) to avoid harmonics developed in the machine
 - (c) to avoid noise developed in the machine
 - (d) to avoid overhang
35. The speed of the d.c. motor decreases as the flux in the field winding decreases.
- (a) true
 - (b) false
36. The sparking at the brushes in the d.c. generator is attributed to
- (a) quick reversal of current in the coil under commutation
 - (b) armature reaction
 - (c) reactance voltage

- (d) high resistance of the brushes
37. Interpoles in the armature of d.c. generator are used
- (a) to neutralize the reactance voltage only
 - (b) to neutralize the reactance voltage and cross-magnetizing effect of armature reaction
 - (c) to neutralize the cross-magnetizing effect of armature reaction only
 - (d) none of the above
38. The transformer is not used in the d.c. line because
- (a) there is no need to step up the d.c. voltage
 - (b) losses in the d.c. circuit are high
 - (c) Faraday's law is not valid as the rate of change of flux is zero
 - (d) harmonics developed in the transformer will cause distortion in the voltage
39. The transformer is analogous to gear trains.
- (a) true
 - (b) false
40. The d.c. shunt generators are not suited for parallel operation because of their slightly drooping voltage characteristics.
- (a) true
 - (b) false
41. The relationship between no-load generated e.m.f. in the armature and field excitation of a d.c. generator is known as
- (a) Internal characteristic of generator
 - (b) External characteristic of generator
 - (c) Magnetic characteristic or open circuit characteristic of generator
 - (d) Total characteristic of generator
42. The critical resistance of the d.c. generator is the resistance of
- (a) armature
 - (b) load
 - (c) field
 - (d) brushes
43. When a bank of two single-phase transformers in an open delta arrangement is used, each of them supplies
- (a) 33.3% of its output rating
 - (b) 86.6% of its output rating
 - (c) 48.6% of its output rating
 - (d) 100% of its output rating
44. Two single phase transformers with proper connections can be used to achieve a three phase output from three phase input.
- (a) true
 - (b) false
45. A thicker wire is used in the d.c. series field winding than d.c. shunt field winding in d.c. machines
- (a) to prevent mechanical vibrations
 - (b) to produce large flux
 - (c) because it carries the load current which is much higher than shunt field current for the same rating of d.c. machines
 - (d) to provide strength

46. Transformer core is laminated
- (a) because it is difficult to fabricate solid core
 - (b) because laminated core provides high flux density
 - (c) to avoid eddy current and hysteresis losses
 - (d) to increase the main flux
47. The mechanical power developed by the d.c. motor is maximum when
- (a) back e.m.f. is equal to applied voltage
 - (b) back e.m.f. is equal to zero
 - (c) back e.m.f. is equal to half the applied voltage
 - (d) none of the above
48. which of the motors is used to drive the constant speed line shafting, lathes, blowers and fans ?
- (a) D.C. shunt motor
 - (b) D.C. series motor
 - (c) Cumulative compound motor
 - (d) none of the above
49. In series-parallel control method when two d.c. series motors are connected in series, the speed of the set is
- (a) half of the speed of the motors when connected in parallel
 - (b) one-fourth of the speed of motors when connected in parallel
 - (c) same as in parallel
 - (d) rated speed of any one of the motors
50. The torque produced by series combination of two d.c. series motors is
- (a) equal to the torque when they are connected in parallel
 - (b) half of the torque when they are connected in parallel
 - (c) four times of the torque when they are connected in parallel
 - (d) twice of the torque when they are connected in parallel
51. The use of the starter in d.c. motors is necessary because
- (a) they are not self-starting
 - (b) initially there is no back e.m.f. and armature current is very high which is to be avoided by using high resistance starter
 - (c) to overcome back e.m.f.
 - (d) none of the above
52. The speed of the d.c. motor can be varied
- (a) by varying field current only
 - (b) by varying field current or armature resistance
 - (c) by varying supply voltage only
 - (d) (b) or (c)
53. The electrical energy can be converted into chemical energy.
- (a) true
 - (b) false
54. The mercury arc rectifier can be used as an inverter.
- (a) true
 - (b) false

55. The hum in the transformer is mainly attributed to
(a) laminations of the transformer (b) magnetostriction
(c) oil of the transformer (d) walls of the tanks
56. To obtain the sinusoidal voltage the poles should have the shape such that the length of the air gap at any point is
(a) proportional to $1/\sin \theta$, where θ is the angle measured in electrical degrees between the point in the question and centre of the pole
(b) proportional to $1/\cos \theta$, where θ is same as defined in (a)
(c) proportional to $\sin \theta$
(d) proportional to $\cos \theta$
57. The power transformer is a
(a) constant current device (b) constant main flux device
(c) constant voltage device (d) constant power device
58. An induction motor is
(a) self-starting with zero torque
(b) self-starting with high torque
(c) self-starting with small torque than rated torque
(d) none of the above
59. As the load is increased the speed of d.c. shunt motor will
(a) increase proportionately (b) remains almost constant
(c) increase slightly (d) reduce slightly
60. Two transformers operating in parallel will share the load depending upon their
(a) ratings (b) leakage reactance
(c) efficiency (d) per unit impedance
61. The equalizer rings are used in
(a) lap winding (b) wave winding
(c) multilayer wave winding (d) none of the above
62. The generator is called flat compounded if
(a) the series field ampere turns are such as to produce the same voltage at rated load as at no load
(b) the series field turns are such as that the rated load voltage is greater than no load voltage
(c) the rated voltage is less than the no load voltage
(d) none of the above
63. The slip test is used
(a) to measure the slip of the induction motor
(b) to measure the torque of the induction motor
(c) to measure the X_d and X_q of the alternator
(d) for none of the above
64. What will happen if the back e.m.f. in the d.c. motor absent ?
(a) motor will run faster than rated value

- (b) motor will burn
 - (c) armature drop will be reduced substantially
 - (d) none of the above
65. The armature torque of the d.c. shunt motor is proportional to
- (a) armature current only
 - (b) field flux only
 - (c) armature current and flux both
 - (d) none of the above
66. The back e.m.f. has no relation with armature torque in d.c. motors.
- (a) true
 - (b) false
67. The speed of the d.c. shunt motor increases as the armature torque increases.
- (a) true
 - (b) false
68. The horsepower obtained from the shaft torque is called
- (a) Indicated horsepower or I.H.P.
 - (b) Brake horsepower or B.H.P.
 - (c) F.H.P.
 - (d) none of the above
69. For d.c. shunt motors the speed is dependent on back e.m.f. only because
- (a) flux is practically constant in d.c. shunt motors
 - (b) flux is proportional to armature current
 - (c) armature drop is negligible
 - (d) back e.m.f. is equal to armature drop
70. It is preferable to start d.c. series motor with some mechanical load because
- (a) it may develop excessive speed otherwise and damage itself
 - (b) it will not run at no load
 - (c) a little load will act as a starter to the motor
 - (d) none of the above
71. When the torque of the d.c. series motor is doubled the power is increased by
- (a) 70%
 - (b) 50% to 60%
 - (c) 20%
 - (d) 100%
72. When two d.c. series generators are running in parallel an equilizer bar is used
- (a) because two similar machines will pass approximately equal currents to the load
 - (b) to reduce the combined effect of armature reaction of both machines
 - (c) to increase the speed and hence generated e.m.f.
 - (d) to increase the series flux
73. The speed of the d.c. motors can be controlled by
- (a) controlling flux only

- (b) controlling flux, armature resistance and voltage
 - (c) controlling voltage and flux only
 - (d) controlling armature resistance and voltage only
74. The diverter in d.c. machine is basically potential divider.
(a) true (b) false
75. The speed/current curve for a d.c. series motor with resistance in series field will lie above the curve without resistance in series field.
(a) true (b) false
76. A diverter across the armature of d.c. motor cannot be used for giving speeds lower than the rated speed.
(a) true (b) false
77. the field flux of the d.c. motor can be controlled to achieve.
(a) the speeds above the rated speed
(b) the speeds lower than rated speed
(c) the speeds above and below the rated speed
(d) steady speed
78. The reversal of rotation of motors and as electric braking is known as
(a) regenerative braking (b) plugging
(c) dynamic braking (d) none of the above
79. Which of the following methods of braking is used in rolling mills ?
(a) plugging (b) regenerative braking
(c) dynamic braking (d) mechanical brakes
80. Regenerative method of braking is based on that
(a) back e.m.f. of motor is more than the applied voltage
(b) back e.m.f. is equal to the applied voltage
(c) back e.m.f. is less than the applied voltage
(d) none of the above
81. Swinburne's test is applied to
(a) those machines in which the flux is practically constant
(b) those machines in which flux is varying
(c) those machines in which flux is proportional to armature current
(d) none of the above
82. The retardation test is applicable to shunt motors and generators and is used to find
(a) the stray losses (b) the copper losses
(c) the eddy current losses (d) the friction losses

83. In the load Field's test the two similar d.c. series machines are mechanically coupled. The output of the generator is fed to the resistance and hence is called regenerative test.
- (a) true
 - (b) false
84. The use of higher flux density in the transformer design
- (a) reduce the weight per KVA
 - (b) increases weight per KVA
 - (c) has no relation with the weight of the transformer
 - (d) increases the weight per KW
85. The oil used in the small transformer provides
- (a) cooling only
 - (b) insulation only
 - (c) insulation and cooling both
 - (d) lubrication only
86. The oil used in the transformer should be free from moisture because
- (a) moisture will reduce the density of the oil which is slightly undesirable
 - (b) moisture will reduce the dielectric strength of the oil and hence insulation is weakened
 - (c) moisture will reduce the lubricating property of the oil
 - (d) moisture will develop rust
87. ASKARELS is the trade name given to
- (a) natural mineral oil used in the transformer
 - (b) synthetic insulating fluids used in the transformer
 - (c) insulating materials for transformers
 - (d) insulating materials for motors and generators
88. The conservator is used in the transformer
- (a) to supply oil to transformer whenever needed
 - (b) to protect transformer from damage when oil expands due to rise in temperature. It stores the increasing volume of the oil
 - (c) to provide the fresh air cool down the oil
 - (d) to store water for transformer cooling
89. Which of the following statement is correct ?
- (a) Induction coil works on A.C.
 - (b) Transformer is used to step up the potential of d.c.
 - (c) The output current of induction coil is nearly unidirectional
 - (d) In the step down transformers, the transformation ratio is always greater than one
90. The induced e.m.f. in the transformer secondly will depend on
- (a) frequently of the supply only
 - (b) number of turns in secondary only
 - (c) maximum flux in core and frequency only
 - (d) frequency, flux and number of turns in the secondary

91. No load primary input is practically equal to the iron loss in the transformer because primary current is very small.
(a) true (b) false
92. If R_2 is the resistance of secondary winding of the transformer and K is transformation ratio then the equivalent secondary resistance referred to primary will be
(a) R_2/K^2 (b) R_2^2/K^2
(c) R_2/K (d) R_2/\sqrt{K}
93. A transformer with magnetic leakage is equivalent to an ideal transformer with inductive coils connected in both primary and secondary.
(a) true (b) false
94. The leakage flux links both of the windings of transformer and hence contributes to the transfer of energy from primary of the transformer to secondary.
(a) true (b) false
95. The vector diagram of the three phase transformer is equivalent to the vector diagram of three phase induction motor with short circuited secondary. If the secondary of the transformer is wound on a shaft and treated as rotor and primary is fed three phase supply, the rotor will run and behaves like an induction motor.
(a) true (b) false
96. The short circuit test in the transformer is used to determine
(a) the iron loss at any load
(b) the copper loss at any load or at full load
(c) the hysteresis loss
(d) the eddy current loss
97. If the power factor is leading the regulation of a good transformer will be higher than when it is lagging.
(a) true (b) false
98. A good transformer must have regulation as high as possible.
(a) true (b) false
99. The percentage resistance, reactance and impedance have the same whether referred to primary or secondary of the transformer.
(a) true (b) false
100. Which of the following electrical machines has the highest efficiency?
(a) D.C. shunt motor (b) Transformer
(c) Induction motor (d) Synchronous motor
101. The efficiency of the transformer is independent of power factor.
(a) true (b) false

- 102.** The condition for the maximum efficiency of the transformer is that
- copper losses are half of the iron losses
 - copper losses are equal to iron losses
 - copper losses are negligible in comparison to iron losses
 - iron losses are zero
- 103.** If the iron loss and full load copper losses are given then the load at which two losses would be equal (*i.e.* corresponding to maximum efficiency) is given by
- full load $\times \frac{\text{iron loss}}{\text{f.l.cu-loss}}$
 - full load $\times \frac{(\text{iron loss})^2}{\text{f.l.cu-loss}}$
 - full load $\times \sqrt{\frac{\text{iron loss}}{\text{f.l.cu-loss}}}$
 - full load $\times \sqrt{\frac{\text{f.l. cu-loss}}{\text{iron loss}}}$
- 104.** The distribution transformers are designed to keep core losses minimum and copper losses are relatively less important because
- the primary of such transformers is energized for all twenty four hours and core losses occur throughout the day whereas copper losses will occur only when secondary is supplying load
 - core losses are always more than copper losses
 - core losses may destroy the insulation
 - core losses will heat up the oil of the transformer rapidly
- 105.** The tapping in the transformer are always provided in the low voltage side.
- true
 - false
- 106.** Enumerate the conditions for successful parallel operation of the single phase transformers
- The percentage impedance should be equal
 - The transformers should be properly connected with regard in polarity
 - The primary windings of the transformers should be suitable for the supply system voltage and frequency
 - The voltage ratings of transformers of primary and secondary windings should be identical
- 107.** What will happen if the transformers working in parallel are not connected with regard to polarity ?
- Incorrect polarity will result in dead short-circuit
 - The transformers will not share load in proportion to their KVA ratings
 - The power factors of two transformers will be different from the power factor of common load
 - None of the above
- 108.** What will happen if the percentage impedances of the two transformers working in parallel are different ?
- Parallel operation will not be possible

- (b) Parallel operation will still be possible, but the power factors at which the two transformers operate will be different from the power factor of the common load
 - (c) Transformers will be over heated
 - (d) Power factors of both of the transformers will be same
- 109.** Which of the following connections is most suitable and economical for small, high-voltage transformers ?
- (a) Delta-delta connection
 - (b) Star-star connection
 - (c) Star-delta connection
 - (d) Delta-star connection
- 110.** Delta-delta connection is economical for large, low-voltage transformers in which insulation problems is not urgent.
- (a) true
 - (b) false
- 111.** The average power factor at which open-delta bank of single phase transformers operates is less than that of load.
- (a) true
 - (b) false
- 112.** Scott connection is used
- (a) to accomplish three phase to three phase transformation only
 - (b) to accomplish three phase to two phase transformation only
 - (c) to accomplish three phase to three phase and three phase to two phase transformation
 - (d) none of the above
- 113.** Under balanced load conditions, main transformer rating in the Scott connection is
- (a) 10% greater than teaser transformer
 - (b) 15% greater than teaser transformer
 - (c) 57.7% greater than teaser transformer
 - (d) 66.6% greater than teaser transformer
- 114.** If the load is balanced on one side of the transformer in the Scott connection, the load is balanced on the other side as well.
- (a) true
 - (b) false
- 115.** If K is the transformation ratio of main transformer in the Scott connection then the transformation ratio of the teaser will be
- (a) $K/\sqrt{3}$
 - (b) $\sqrt{3}/2K$
 - (c) $2K/\sqrt{3}$
 - (d) $\sqrt{K/2}$
- 116.** The rotor slots are usually given slight skew in the squirrel case induction motor
- (a) to increase the tensile strength of the rotor bars and hence strength
 - (b) to reduce the magnetic hum and locking tendency of the rotor
 - (c) to save the copper used
 - (d) because of easy in fabrication

- 117.** The starting torque of the slip ring induction motor can be increased by
- (a) adding external resistance to the rotor
 - (b) adding the external inductance to the rotor
 - (c) adding both resistance and inductance to the rotor
 - (d) adding external capacitance to the rotor
- 118.** What will happen if the relative speed between the rotating flux of stator and rotor of the induction motor is zero ?
- (a) the rotor will not run
 - (b) the rotor will run at very high speed
 - (c) the slip of the motor will be zero
 - (d) the torque produced will be very large
- 119.** When the rotor starts rotating the frequency of the rotor of induction motor will depend on relative speed of the stator and the rotor.
- (a) true
 - (b) false
- 120.** A 400 KW, 3 Phase, 440 volts, 50 Hz AC induction motor has a speed of 950 rpm on full load. The machine has 6 poles. The slip of machine will be
- (a) 0.06
 - (b) 0.10
 - (c) 0.04
 - (d) 0.05
- 121.** If the rotor of the induction motor is assumed non-inductive, the torque acting on each conductor will be positive or undirectional.
- (a) true
 - (b) false
- 122.** Which of the following statement is most appropriate if T is the starting torque developed in the rotor and V is the supply voltage to the stator.
- (a) T is proportional to V^2
 - (b) T is proportional to V
 - (c) T is proportional to \sqrt{V}
 - (d) T is proportional to $V^{1/4}$
- 123.** A change of 5% in supply voltage to an induction motor will produce a change of approximately
- (a) 5% in the rotor torque
 - (b) 7% in the rotor torque
 - (c) 25% in the rotor
 - (d) 10% in the rotor torque
- 124.** The torque of a rotor in an induction motor under running condition is maximum
- (a) at the value of the slip which makes rotor reactance per phase equal to the resistance per phase
 - (b) at the value of the slip which makes the rotor reactance half of the rotor resistance
 - (c) at the unit value of the slip
 - (d) at the zero value of the slip
- 125.** By varying the rotor resistance in the slip ring induction motor the maximum torque can be achieved at any desired slip or speed of the motor.
- (a) true
 - (b) false

- 126.** The maximum torque of an induction motor varies directly as applied voltage.
(a) true (b) false
- 127.** The shape of the torque/slip curve of induction motor is
(a) hyperbola (b) parabola
(c) straight line (d) rectangular parabola
- 128.** Which of the following statement is correct when referred to induction motor ?
(a) the maximum torque will depend on rotor resistance
(b) although the maximum torque does not depend on rotor resistance yet the exact location of maximum torque is depend on it
(c) the maximum torque will depend on standstill reactance of rotor
(d) the slip of the induction motor decreases as the torque increases
- 129.** If an induction motor has a slip of 2% at normal voltage, what will be the approximate slip when developing the same torque at 10% above normal voltage ?
(a) 1.6% (b) 2%
(c) 1.65% (d) 1.1%
- 130.** The slip of the induction motor can be measured by comparing the rotor and stator supply frequencies.
(a) true (b) false
- 131.** When the frequency of the rotor of induction motor is small, it can be measured by
(a) galvanometer
(b) d.c. moving coil millivoltmeter
(c) d.c. moving coil ammeter (d) a.c. voltmeter
- 132.** The rotor efficiency of induction motor is called
(a) I.H.P. (b) F.H.P.
(c) B.H.P. (d) none of the above
- 133.** The rotor efficiency of induction motor is defined as the ratio of actual speed of rotor to synchronous speed of rotor.
(a) true (b) false
- 134.** The synchronous watt can be defined as follows :
(a) This is the unit of rating of synchronous machine
(b) This is the unit of torque defined at radius unit
(c) This is the torque, which at the synchronous speed of the machine under consideration, would develop a power of 1 watt
(d) This is the unit of the power when the power factor in the power equation is omitted

- 135.** The synchronous wattage of an induction motor equals the power transferred across the air gap to the rotor in the induction motor.
(a) true (b) false
- 136.** When it is said that an induction motor is developing a torque of 900 synchronous watts, it means that the rotor input is 900 watts and that torque is such that the power developed would be 900watts provided the rotor was running synchronously and developing the same torque.
(a) true (b) false
- 137.** The power output of induction motor will be maximum when
(a) the equivalent load resistance is equal to the standstill reactance of the motor
(b) the equivalent load resistance is equal to the resistance of the rotor
(c) the equivalent resistance is equal to the standstill leakage impedance of the motor
(d) the slip is zero
- 138.** The complete circle diagram of induction motor can be drawn with the help of data found from
(a) no load test (b) blocked rotor test
(c) (a) and (d) both
(d) (a), (b) and stator resistance test
- 139.** The transformation ratio of the induction motor cannot be defined in terms of stator and rotor currents.
(a) true (b) false
- 140.** The maximum torque of induction motor varies directly as standstill reactance of rotor.
(a) true (b) false
- 141.** The value of transformation ratio of an induction motor can be found by
(a) short circuit test only (b) open circuit test only
(c) slip test (d) stator resistance test
- 142.** The power scale of circle diagram of an induction motor can be found from
(a) no load test only (b) short circuit test only
(c) stator resistance test (d) none of the above
- 143.** The starting torque of induction motor cannot be determined from circle diagram.
(a) true (b) false
- 144.** It is advisable to avoid line-starting of induction motor and use starter because
(a) starting torque is very high
(b) motor takes five to seven times its full load current
(c) it will pick-up very high speed and may go out of step
(d) it will run in reverse direction

- 145.** The induced e.m.f. in the rotor of an induction motor is proportional to
- supply voltage only
 - relative velocity between flux and rotor conductors
 - (a) and (b) both
 - slip

- 146.** The relation between maximum torque and full load torque (T_{\max} , T_f respectively) when referred to induction motor is given by

$$(a) \frac{T_f}{T_{\max}} = \frac{2a}{(a^2 + s^2)} \quad (b) \frac{T_f}{T_{\max}} = \frac{2}{(a^2 + s^2)}$$

$$(c) \frac{T_f}{T_{\max}} = \frac{2as}{(a^2 + s^2)} \quad (d) \frac{T_f}{T_{\max}} = \frac{a}{(a^2 + s^2)}$$

where s is the slip and

$$a = \frac{R^2}{X^2} = \frac{\text{Resistance of the rotor}}{\text{Reactance of the rotor}}$$

- 147.** In the above question the relation between standstill torque (T_s) and maximum torque (T_{\max}) is given by

$$(a) \frac{T_s}{T_{\max}} = \frac{2a}{1 + a^2} \quad (b) \frac{T_s}{T_{\max}} = \frac{2a}{s^2 + a^2}$$

$$(c) \frac{T_s}{T_{\max}} = \frac{2}{1 + s^2} \quad (d) \frac{T_s}{T_{\max}} = \frac{2a}{s^2 + 1}$$

- 148.** The slip of the induction motor can be calculated if the rotor copper losses and rotor input are known.

- true
- false

- 149.** The auto-starters (using three auto-transformers) can be used to start cage induction motor of the following type :

- star connected only
- delta connected only
- (a) and (b) both
- none of the above

- 150.** The torque developed in the cage induction motor with auto-starter is

- $K \times$ torque with direct switching
- K /torque with direct switching
- $K^2 \times$ torque with direct switching
- K^2 /torque with direct switching

where tapping of transformation ratio K is used in case of auto-transformer.

- 151.** Percentage tapping required of an auto-transformer for a cage motor to start the motor against $\frac{1}{4}$ of full load will be

- (a) 70% (b) 71%
(c) 71.5% (d) 72.2%

when the short circuit current on normal voltage is 4 times the full load and full load slip is 30%.

- 152.** The start-delta switch is equivalent to auto-transformer of ratio (when applied to delta connected cage induction motor)
(a) 57% (b) 56.5%
(c) 86.6% (d) 58% approximately
- 153.** The rotor current can be reduced by introducing star connected resistance starter in the rotor circuit of the cage motor and slip ring motor as well.
(a) true (b) false
- 154.** The slip ring motor can be started under load conditions.
(a) true (b) false
- 155.** The crawling in the induction motor is caused by
(a) improper design of the machine
(b) low voltage supply
(c) high loads
(d) harmonics developed in the motor
- 156.** Cogging in the induction motor usually occurs at high voltage.
(a) true (b) false
- 157.** The outer cage in the double squirrel cage motor has low resistance copper bars.
(a) true (b) false
- 158.** The torque/speed characteristics of double squirrel cage induction motor may be taken to be sum of two motors, one having a high resistance rotor and other a low resistance one.
(a) true (b) false
- 159.** When the equivalent circuit diagram of double squirrel cage induction motor is constructed the two rotor cages can be considered
(a) in parallel (b) in series parallel
(c) in series (d) in parallel with stator
- 160.** The speed of the cage induction motor cannot be controlled from the rotor side.
(a) true (b) false
- 161.** Which of the following methods is easily applicable to control the speed of the squirrel cage induction motor?
(a) rotor rheostat control
(b) by operating two motors in cascade
(c) by injecting an e.m.f. in the rotor circuit
(d) by changing the number of stator poles

- 162.** Rotor rheostat control to control the speed of the induction motor is only applicable to slip-ring induction motors.
(a) true (b) false
- 163.** The injected e.m.f. in the rotor of induction motor must have
(a) the same frequency as the slip frequency
(b) the same phase as the rotor e.m.f.
(c) high value for the satisfactory speed control
(d) zero frequency
- 164.** The additional stator winding is used in the compensated repulsion motor
(a) to improve power factor and provide better speed regulation
(b) to eliminate armature reaction
(c) to prevent hunting in the motor
(d) to provide mechanical balance
- 165.** Repulsion start induction-run motor can be applicable to commercial refrigerators.
(a) true (b) false
- 166.** The rotation of the repulsion induction motor can be reversed by the usual brush shifting arrangement.
(a) true (b) false
- 167.** The power factor improvement of a.c. series motor is only possible by
(a) increasing the magnitude of inductances of field and armature winding
(b) decreasing the magnitude of reactances and armature winding
(c) equalizing the armature resistance to armature reactance
(d) none of the above
- 168.** If the number of the turns on the field winding in a.c. series motor is decreased, the speed of motor increases but torque decreases. The same torque can be achieved by
(a) increasing the number of turns on armature winding proportionately
(b) decreasing the number of turns on armature winding
(c) increasing armature resistance
(d) equalizing the armature resistance to the armature reactance
- 169.** In conductively-compensated a.c. series motors, the compensating winding is
(a) connected in parallel with the armature
(b) short circuited and has no interconnection with the motor circuit
(c) connected in series with the armature
(d) none of the above

- 170.** The current in inductively compensated winding of the a.c. series motor is proportional to the armature current and 180 degree out of phase.
(a) true (b) false
- 171.** The huge voltage, induced in the short circuited coil (by transformer action) of a.c. series motor when commutation takes place is neutralized by
(a) increasing inductance of the compensating winding
(b) increasing resistance of the compensating winding
(c) decreasing the number of turns in the compensating winding
(d) shunting the winding of each commutating pole with non-inductive resistance
- 172.** A universal motor is defined as a motor which may be operated either on d.c. or single phase a.c. supply at
(a) same output but different speeds
(b) same speed and different output
(c) approximately same output and same speed
(d) synchronous speed
- 173.** It is preferred to use single turn coil in the armature of the single phase a.c. series motors
(a) to facilitate commutation and avoid sparking at the brushes
(b) to reduce the resistance of the armature
(c) to reduce the reactance of the armature
(d) to reduce the weight of the armature
- 174.** Which of the following motor is unexcited single phase synchronous motor ?
(a) A.C. series motor (b) universal motor
(c) repulsion motor (d) reluctance motor
- 175.** Which of the following motors is most suitable for signalling devices and many kinds of timers ?
(a) D.C. series motor (b) A.C. series motor
(c) induction motor (d) reluctance motor
- 176.** The wide-open type slots in the design of stator of alternator will present the following disadvantage ?
(a) The size of the machine will increase
(b) The size of the stator will increase
(c) Air gap flux is distributed in the tufts and produce ripples in the wave of generated e.m.f.
(d) none of the above
- 177.** What kind of rotor is most suitable for turbo-alternators which are designed to run at high speed ?
(a) salient pole type (b) none-salient pole type
(c) (a) or (b) (d) none of the above

- 178.** The power developed in the alternator having salient type rotor is less than that of having non-salient pole.
(a) true (b) false
- 179.** The damping winding in the synchronous motors is often used
(a) to prevent hunting only
(b) to prevent hunting and provide the starting torque
(c) to maintain proper synchronism
(d) to provide the starting torque only
- 180.** The turbo-alternators are seldom characterised by small diameters and very long axial or rotor length.
(a) true (b) false
- 181.** The maximum speed of an alternator at power frequency of 50 Hz will be
(a) 3600 rpm (b) 3300 rpm
(c) 3000 rpm (d) 1500 rpm
- 182.** Which of following statement is correct ?
(a) Short pitched coils in the alternators are used to reduce the size of the machines.
(b) Short pitched coils are used to reduce the harmonics or to eliminate the harmonics from the generated e.m.f.
(c) Short pitched coils are used to provide accurate phase difference of 120 degree to one phase to other.
(d) Short pitched coils are used to reduce copper losses.
- 183.** The disadvantage of using short pitched coils in the alternator is that
(a) total induced e.m.f. is increased
(b) total induced voltage is reduced
(c) total induced voltage is distorted
(d) total induced voltage is more and hence more insulation is required
- 184.** The coil span factor is defined as
(a) $\frac{\text{vector sum of induced e.m.f.s. per coil}}{\text{terminal voltage of the generator}}$
(b) $\frac{\text{arithmetic sum of induced e.m.f.s. per coil}}{\text{vector sum of induced e.m.f.s. per coil}}$
(c) $\frac{\text{vector sum of induced e.m.f.s. per coil}}{\text{arithmetic sum of induced e.m.f.s. per coil}}$
(d) $\frac{\text{arithmetic sum of induced e.m.f.s. per coil}}{\text{terminal voltage of the generator}}$
- 185.** The induced e.m.f. in an alternator with distributed winding is always more than that of with concentrating winding.
(a) true (b) false

- 186.** A three phase, 4 pole, 24-slots alternator has its armature coil short pitched by one slot. The distribution factor of alternator will be
(a) 0.96 (b) 0.9
(c) 0.933 (d) 0.966
- 187.** In case of an alternator, the power factor of the load has a considerable effect on the armature reaction unlike d.c. generators.
(a) true (b) false
- 188.** When the power factor of load is unity, the armature flux of an alternator will be
(a) demagnetizing (b) cross-magnetizing
(c) square waveform (d) in phase with current
- 189.** When the load has power factor zero lagging, the main flux of the alternator will decrease.
(a) true (b) false
- 190.** The armature reaction of an alternator will be completely magnetizing when
(a) load power factor is unity
(b) load power factor is zero lagging
(c) load power factor is zero leading
(d) load power factor is 7.0 lagging
- 191.** The synchronous reactance is defined as the
(a) reactance due to armature reaction of the machine
(b) reactance of synchronous machine
(c) reactance due to leakage flux
(d) combined reactance due to leakage of flux and armature reaction
- 192.** In case of leading load power factor, the terminal voltage of alternator will fall on removing the full load.
(a) true (b) false
- 193.** The rise of the voltage of alternator when the load is thrown off is same as the fall in the voltage when full load is applied.
(a) true (b) false
- 194.** Give the three methods of determining the voltage regulation of the alternator.
(i) Synchronous Impedance Method
(ii) M.M.F. Method
(iii) Potier Triangle Method
- 195.** The synchronous impedance method will not give accurate voltage regulation because
(a) the value of synchronous impedance found is always less than actual value

- (b) the value of synchronous impedance found is always less than the actual value
 - (c) the value of the synchronous impedance is independent of saturation
 - (d) the reactance due to armature reaction is considered separately
- 196.** The value of the voltage regulation found by the M.M.F. method is always less than the actual value.
- (a) true
 - (b) false
- 197.** Which of the following methods is better to find the voltage regulation ?
- (a) M.M.F. Method
 - (b) Potier Triangle Method
 - (c) Synchronous Impedance Method
 - (d) none of the above
- 198.** The operation of connecting an alternator in parallel with another alternator or with common bus bar is known as
- (a) proper machine
 - (b) mechanizing
 - (c) synchronizing
 - (d) asynchronizing
- 199.** Give the three conditions for the proper synchronization of alternator
- (i) The terminal voltage for the incoming alternator must be same as bus bar voltage.
 - (ii) The speed of the incoming machine must be such that its frequency ($= PN/120$) equals bus bar frequency.
 - (iii) The phase of the alternator voltage must be identical with the phase of the bus bar voltage. It means that switch must be closed at (or very near) the instant of the two voltage have correct relationship.
- 200.** In three phase alternators, it is necessary to synchronize one phase only, the other phases will be synchronized automatically.
- (a) true
 - (b) false
- 201.** When the alternators are running in proper synchronism the synchronizing power will be zero
- (a) true
 - (b) false
- 202.** If the two alternators are running in proper synchronism and the voltage of one machine is suddenly increased
- (a) the machines will burn
 - (b) both of the machines will stop
 - (c) the synchronization torque will be produced to restore further synchronism
 - (d) synchronization cannot be attained automatically
- 203.** If the input to the prime-mover of an alternator is kept constant but the excitation is changed then

- (a) the reactive component of the output is changed
 - (b) the active component of the output is changed
 - (c) the power factor of the load remains constant
 - (d) (a) and (b) takes place simultaneously
- 204.** The load taken up by the alternator directly depends upon the driving torque or in other words upon the angular advance of its rotor.
- (a) true
 - (b) false
- 205.** A synchronous motor is inherently self-starting motor.
- (a) true
 - (b) false
- 206.** The working of synchronous motor is, in many ways, similar to
- (a) the power transformer
 - (b) the hydraulic motor
 - (c) the gear train arrangement
 - (d) the transmission of mechanical power by a shaft
- 207.** The coupling angle or load angle of synchronous motor is defined as
- (a) the angle between the rotor and the stator poles of same polarity
 - (b) the angle between the rotor and the stator poles of opposite polarity
 - (c) the angle between the rotor and the stator teeth
 - (d) none of the above
- 208.** The coupling angle of synchronous motor is independent of load.
- (a) true
 - (b) false
- 209.** The torque developed by the synchronous motor is independent of coupling angle.
- (a) true
 - (b) false
- 210.** The back e.m.f. set up in the stator of synchronous motor will depend on
- (a) the rotor excitation only
 - (b) the rotor excitation and speed both
 - (c) the rotor speed only
 - (d) the coupling angle only
- 211.** If the synchronous motor (properly synchronised to the supply) is running on no load and is having negligible loss then.
- (a) the stator current will be very high
 - (b) the stator current will be zero
 - (c) the stator current will be very small
 - (d) the back e.m.f. will be more than the supply voltage
- 212.** The maximum power developed in the synchronous motor will depend on
- (a) the supply voltage only
 - (b) the rotor excitation only

- (c) the rotor excitation and supply voltage both
 - (d) the rotor excitation, supply voltage and maximum value of coupling angle (90 degree)
- 213.** The armature current of the synchronous motor
- (a) has large values for low excitation only
 - (b) has large values for high excitation only
 - (c) has large values for low and high excitation
 - (d) has large current for lagging excitation
- 214.** The minimum armature current of the synchronous-motor
- (a) corresponds to 0.8 power factor
 - (b) corresponds to zero power factor
 - (c) corresponds to 0.866 power factor
 - (d) corresponds to unity power factor
- 215.** The synchronous motor can be used as phase advancer.
- (a) true
 - (b) false
- 216.** A synchronous capacitor is nothing but a synchronous motor running on no load with over excitation.
- (a) true
 - (b) false
- 217.** If the field of the synchronous motor is left short circuited and connected to supply through auto-transformer
- (a) the motor will run at its normal speed
 - (b) the motor will just crawl
 - (c) the motor will run as induction motor
 - (d) the armature will burn because there is no back e.m.f. in the armature
- 218.** The synchronous motor can be operated at desired power factor by varying the excitation to the motor.
- (a) true
 - (b) false
- 219.** The rotary convertor can be used to
- (a) convert a.c. to d.c
 - (b) convert d.c. to a.c.
 - (c) convert linear motion to rotary motion
 - (d) (a) and (b) both
- 220.** A rotary convertor is used to convert a.c. to d.c. but cannot be used to convert d.c. to a.c.
- (a) true
 - (b) false
- 221.** A 2 kW single phase rotary convertor operates at full load from 230 volts a.c. source. Assuming unity power factor and 100% efficiency the d.c. current will be
- (a) 6 A
 - (b) 6.15 A
 - (c) 8.7 A
 - (d) 5 A
- 222.** A rotary convertor can be run as a
- (a) induction motor
 - (b) synchronous motor

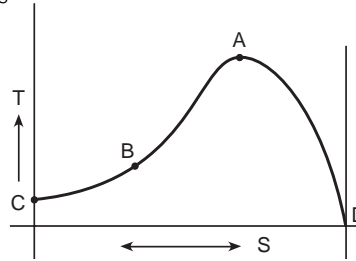
- (c) d.c. series motor (d) d.c. compound motor
- 223.** In the operation of the poly-phase rotary convertors, which of the following should be introduced between the a.c. sources and slip rings ?
- (a) Amplifier (b) Rectifier
(c) Transformer (d) Diode
- 224.** Which of the following statements is true ?
- (a) A rotary convertor can be called a Synchronous inverter.
(b) A rotary convertor can be called a Synchronous convertor.
(c) A rotary convertor can be called a Synchronous divertor.
(d) A rotary convertor can be called a Synchronous capacitor.
- 225.** Which of the following rotary convertors is used in the standard practice ?
- (a) Single phase rotary convertor.
(b) Three phase rotary convertor.
(c) Six phase rotary convertor.
(d) Twelve phase rotary convertor.
- 226.** For a given temperature rise and hence output, a six phase convertor is smaller than three or two phase convertor.
- (a) true (b) false
- 227.** Give the four methods to control d.c. voltage of rotary convertor :
- (i) By using tap changing transformer.
(ii) Series reactance control method.
(iii) Induction regular.
(iv) Synchronous booster control method.
- 228.** The mercury arc rectifier is used as
- (a) convertor only (b) inventor only
(c) (a) and (b) both (d) transducer
- 229.** The arc between the anode and cathode of mercury arc rectifier will persist
- (a) when anode is as positive potential with respect to cathode
(b) when anode is at negative potential with respect to cathode
(c) when anode will repel the electrons
(d) when anode is at very low temperature
- 230.** The purpose of introducing reactor in the ignition circuit of mercury arc rectifier is
- (a) to limit the rate of change of flux in the circuit
(b) to limit the voltage of the circuit
(c) to limit the rate of change of the current in the circuit
(d) to limit the current in the circuit
- 231.** The advantage of using larger phase mercury arc rectifier is that
- (a) they are easily available (b) they work noiselessly

- (c) they are very cheap
(d) their output is much smoother
- 232.** The utility factor of mercury-arc rectifier is defined as
- (a) $\frac{\text{actual power}}{\text{full load rating}}$ (b) $\frac{\text{wattless power component}}{\text{full load rating}}$
(c) $\frac{\text{actual power}}{\text{half load rating}}$ (d) $\frac{\text{total a.c. input}}{\text{total d.c. output}}$
(e) $\frac{\text{total d.c. output}}{\text{total a.c. input}}$
- 233.** Angle of overlap is related to
- (a) diode rectifier
(b) silicon controlled rectifier
(c) mercury-arc rectifier
(d) metal rectifier
- 234.** Give the three types of voltage drop when mercury-arc rectifier is on load :
- (i) Reactance drop (ii) Mean resistance drop
(iii) Arc voltage drop
- 235.** The utilization factor of the six-phase mercury arc rectifier is more than that of three-phase mercury-arc rectifier.
- (a) true (b) false
- 236.** The utilization factor is maximum for
- (a) three-phase mercury arc rectifier
(b) six-phase mercury arc rectifier
(c) twelve-phase mercury arc rectifier
(d) single phase mercury arc rectifier
- 237.** If the air gap of the induction motor is increased
- (a) the power factor will increase
(b) the power factor will decrease
(c) the magnetizing current of the rotor will increase
(d) the magnetizing current of the rotor will decrease
(e) the speed of the motor will decrease
- 238.** The squirrel cage induction motor has
- (a) one slip ring (b) two slip rings
(c) three slip rings (d) zero slip ring
- 239.** What will happen if the supply terminals of d.c. shunt motor are interchanged
- (a) motor will stop
(b) motor will run at its normal speed in the same direction as it was running
(c) the direction of rotation will reverse
(d) motor speed will increase

240. An amplidyne can be used as
 (a) a d.c. series motor (b) a d.c. shunt motor
 (c) a d.c. compound motor (d) magnetic amplifier

241. The torque/slip characteristic of induction motor is shown, which is the unstable region ?

- (a) A (b) B
 (c) C (d) D



242. Find the odd man out

- (a) tachometer
 (b) voltmeter
 (c) ammeter
 (d) galvanometer

243. The mechanical load across the induction motor is equivalent to electrical load of

- (a) $R_2 (1/s - 1)$ (b) $R_2 \left(\frac{1}{s} - 1 \right)$
 (c) $R_2 (s - 1)$ (d) $1/R_2 (s - 1)$

where R_2 is the resistance of the rotor in terms of secondary and s is the slip of motor.

244. If the supply frequency to the transformer is increased the iron loss

- (a) will decrease (b) will increase
 (c) will not change (d) will reach nearly zero

245. In the d.c. motors iron losses occur in

- (a) the yoke (b) the pole shoe
 (c) the armature (d) the field

246. With the use of high flux density in the transformer

- (a) the size of core will decrease
 (b) less copper will be used
 (c) core losses will decrease
 (d) voltage output will decrease

247. The induced e.m.f. in the armature of d.c. machine rotating in the stationary field will be

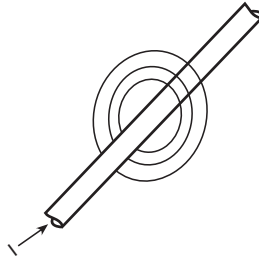
- (a) sinusoidal voltage
 (b) direct voltage
 (c) sinusoidal with even harmonics
 (d) sinusoidal with odd harmonics

248. The air gap between poles has

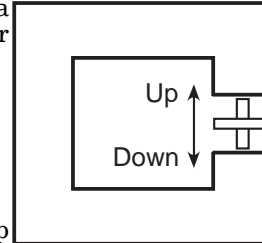
- (a) no magnetic field
 (b) no magnetic field unless the poles are far apart
 (c) a strong magnetic field
 (d) a magnetic field if the poles touch

- 249.** Magnetic induction results in
- (a) induced poles opposite from the original field poles
 - (b) induced poles the same as the original field
 - (c) two north poles
 - (d) an induced magnetic field but no induced pole
- 250.** Which of the following statement is true ?
- (a) Iron, steel and nickel are magnetic materials.
 - (b) Copper, iron, steel and air are magnetic materials.
 - (c) Paper, wood and steel are magnetic materials.
 - (d) Iron is magnetic material but steel is non-magnetic.
- 251.** In an electromagnet
- (a) current must flow through the coil to produce magnetic field
 - (b) the magnetic field has the same strength with or without current
 - (c) current must flow but no voltage need be applied across the coil
 - (d) the coil must have high resistance for minimum coil current
- 252.** The motor action in a wire conducting current can be produced
- (a) without any additional magnetic field
 - (b) by moving the conductor from a weaker field towards stronger field
 - (c) by moving the conductor from stronger field towards weaker field
 - (d) by producing the motion by not rotation
- 253.** The requirement for producing induced voltage is
- (a) magnetic flux moving across a conductor
 - (b) magnetic field moving across a dielectric
 - (c) an insulated wire free from any external magnetic field
 - (d) a bare wire moving parallel to an external magnetic field
- 254.** A 5 : 1 voltage step up transformer has 120 volts across the primary and 600 ohms resistance across the secondary. Assuming 100% efficiency the primary current equals
- (a) 1/5 amp
 - (b) 500 ma
 - (c) 10 amps
 - (d) 20 amps
 - (e) 5 amps
- 255.** In a transformer, the voltage induced in the secondary winding must always be 90 degree out of phase with the
- (a) primary voltage
 - (b) primary current
 - (c) secondary voltage
 - (d) secondary current
- 256.** A ferrite core has less eddy-current loss than an iron core because
- (a) ferrites have low resistance
 - (b) ferrites have high resistance

- (c) ferrites have low permeability
(d) ferrites have high hysteresis
257. Which of the following motors is usually used in household refrigerators ?
(a) d.c. shunt motor (b) reluctance motor
(c) single phase induction motor (split phase start or induction run motor)
(d) synchronous motor
258. If the refrigerator unit runs continuously maintaining cabinet cold, the failure of unit is attributed to
(a) extreme hot weather conditions
(b) poor door seal at gasket
(c) defective motor (d) defective thermostat
259. The maximum temperature permitted for Class A insulation is
(a) 180°C (b) 105°C
(c) 120°C (d) 155°C
260. The cotton, silk paper and wood are
(a) class A insulation (b) class Y insulation
(c) class H insulation (d) class B insulation
261. Rheostatic braking gives greater braking torque than plugging.
(a) true (b) false
262. Which of the following rules states that the direction of an induced current is always such that the magnetic field which it produces reacts in opposition to the change of flux.
(a) Thumb rule (b) Lenz's law
(c) Kirchhoff's law (d) Faraday's law
263. What conditions are necessary for an induced voltage to be created by means of rotation.
(a) A magnetic field
(b) Movable placed loops conductors (turns)
(c) Lump conductors (d) (a) and (b) both
264. In the following diagram of a line conductor, in which direction do the magnetic lines of force run if the observer is looking in the direction of current ?



- (a) counter-clockwise around the conductor
 (b) clockwise around the conductor
 (c) around the conductor (d) outside the conductor
265. Which of the following rule is applied to above question to find direction of magnetic lines ?
 (a) Left hand rule (b) Right hand rule
 (c) Corkscrew rule (d) Lenz's law
266. In the adjacent figure, what kind of voltage is generated by linear movement of a horizontally or vertically loop in or counter to the direction of magnetic field ?
 (a) A D.C. voltage
 (b) An A.C. voltage
 (c) No voltage
 (d) Pulse voltage
267. What kind of voltage is induced in a loop conductor rotating in an homogeneous magnetic field ?
 (a) A.C. (b) D.C.
 (c) No voltage (d) Pulse voltage
268. If a loop conductor is rotated in the magnetic field, a voltage is induced in it. This voltage increases only with the
 (a) density of the magnetic lines of force
 (b) active length of conductor in exciting field
 (c) velocity of the loop
 (d) length of conductor, velocity and flux density
269. A loop conductor is rotated in a homogeneous magnetic field the magnetic flux
 (a) changes its intensity constantly
 (b) changes its direction with constant density
 (c) changes in intensity with its direction periodically
 (d) changes its intensity with its direction randomly
270. The operation of the electric generator and motor is based on the interaction between
 (a) Magnetic field and electric field
 (b) Magnetic field and electric current
 (c) Electric field and law of induction
 (d) Law of induction and dynamo-electric principle
271. What type of current is normally used to excite the synchronous and DC generators ?
 (a) DC (b) AC single phase
 (c) AC three phase (d) AC two phase



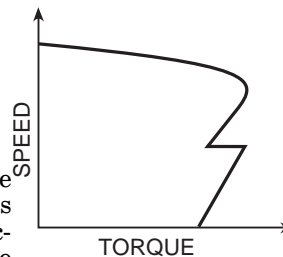
- 272.** Under what conditions will an Electromotive force be exerted on an electric conductor in a magnetic field ?
- (a) The conductor must have diameter
 - (b) The conductor must have current passing through it
 - (c) Magnetic field must be intensified
 - (d) The conductor must be in coil form
- 273.** Which of the following statement is correct ?
- (a) A magnetic field exerts a force on-line conductor
 - (b) The cause of force effect lies in the fact that original magnetic field and that of line conductor affected each other
 - (c) The repulsion takes place in the direction of mutually reducing field forces
 - (d) All the above statements are correct
- 274.** Which of the following transformer will have smallest size with same electrical specifications ?
- (a) Oil Natural Air Natural (ONAN) cooled transformer
 - (b) Dry type transformer
 - (c) Oil Natural Air Force (ONAF) cooled transformer
 - (d) Oil Forced Water Force (OFWF) cooled transformer
- 275.** Which of the following Indian Standards deal with Induction motors ?
- (a) IS : 2026
 - (b) IS : 325
 - (c) IS : 2208
 - (d) IS : 3427
- 276.** 1 H.P. is equivalent to
- (a) 0.746 W
 - (b) 0.746 kW
 - (c) 7.46 W
 - (d) 7.46 kW
- 277.** What kind of bushings will be used in the transformers above 33kV ratings ?
- (a) Porcelain type
 - (b) Condenser type
 - (c) Oil-filled type
 - (d) (b) or (c)
- 278.** If the percentage reactance of a power is 5.0, what will be the per unit reactance ?
- (a) 0.05
 - (b) 0.4
 - (c) 1.0
 - (d) 0.5
- 279.** The eddy current loss in the transformer occurs in the
- (a) Primary winding
 - (b) Secondary winding
 - (c) Laminations
 - (d) None of the above
- 280.** A transformer with output of 250 kVA at 3300 volts, has 1000 turns on its primary winding and 100 turns on secondary winding. What will be the transformation ratio of the transformer ?
- (a) 10
 - (b) 4
 - (c) 5
 - (d) 3

281. In the Q. 280, what will be the primary rated voltage of the transformer ?

- (a) 33,000 V (b) 1650 V
(c) 16,500 V (d) 1500 V

282. The speed-torque characteristics for single-phase induction motor shown below are for

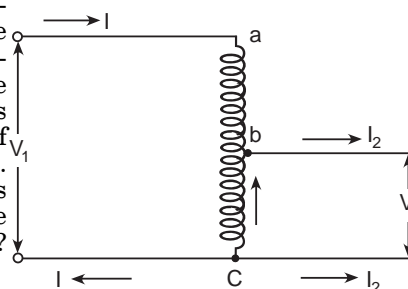
- (a) Shaded pole motor
(b) Split phase motor
(c) Capacitor-start motor
(d) Repulsion-start run motor



283. The induced e.m.f. in one phase of the rotor winding is 120 V when the rotor is blocked and, the resistance and reactance per phase of stator winding are 0.2Ω and 0.3Ω respectively. What will be the rotor current ?

- (a) 330 A (b) 332 A
(c) 250 A (d) 200 A

284. A circuit for the auto transformer is shown below. The point b is located half way between terminals a and c . The resistance of entire winding is 0.1 ohm , and the resistance of the position bc is 0.40 ohm . What will be the copper loss at an output of 10 A when the exciting current is neglected ?



- (a) Watts
(b) 2.5 Watts
(c) 10 Watts (d) 4 Watts

285. In the figure of Q. 284, if the reactance of part ab is 0.2 ohm and that of common part is 0.1 ohm , what will be the input current if primary voltage is 20 V ?

- (a) 60 A (b) 33.3 A
(c) 63.3 A (d) 30 A

286. What will wattmeter indicate is connected across supply line in the figure of Q. 284, provided $V_1 = 20 \text{ V}$ and reactance of ab is 0.2 ohm , reactance of common part is 0.1 ohm and the core loss is neglected

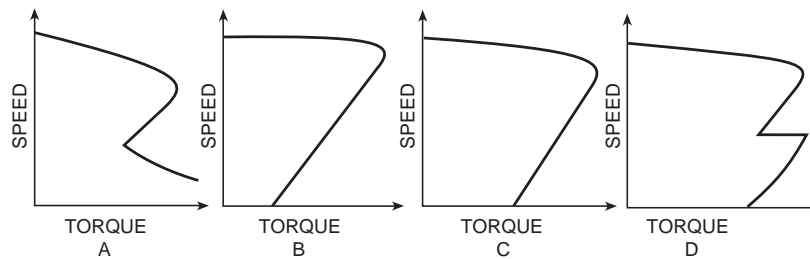
- (a) 200 Watts (b) 100 Watts
(c) 500 Watts (d) 400 Watts

287. A series motor has 2 poles and 95 turns per pole. The resistance of 2 field coils connected in series is 3.02 ohms . The voltage drop

across the field is 62 V and current is 3.55 A at 60 Hz. What will be the field reactance ?

- (a) 27 ohms (b) 60 ohms
(c) 17.2 ohms (d) 68 ohms
- 288.** The armature winding of repulsion motor is excited
(a) Conductively (b) Inductively
(c) Resistively (d) None of the above
- 289.** The armature winding of series motor is excited
(a) Conductively (b) Inductively
(c) Resistively (d) None of the above
- 290.** Which of the following parameters contributes to the friction loss in the alternators ?
(a) Temperature (b) Lubrication of bearings
(c) Load variation (d) Velocity of the shaft
(e) All above parameters
- 291.** The difference between input and I^2R loss will give the
(a) Friction loss (b) Windage loss
(c) Core loss (d) Sum of (a), (b) and (c)
- 292.** The friction, windage and core losses of alternator can easily be determined by
(a) Running the alternator at synchronous speed
(b) Running the alternator as a synchronous motor at rated speed at full load
(c) Running the alternator as a synchronous motor at rated speed at no load
(d) None of the above
- 293.** The eddy-current loss in the alternator will be minimum if the air gap
(a) Between poles and the slots of the armature is large compared to width of the slot
(b) Between poles and the slots of the armature is minimum compared to width of the slot
(c) Does not exist (d) None of the above
- 294.** Eddy current losses in the alternator are
(a) Dependent on the load (b) Independent of the load
(c) Dependent on the excitation
(d) (b) and (c) both (e) None of the above
- 295.** The skewing of the rotor bars of the induction motor
(a) will reduce the induced voltage in each bar to a value less than if the bars were unskewed
(b) will increase the induced voltage in each bar to a value more than if the bars were unskewed
(c) increases the cogging (d) increases the motor noise

- 296.** Which of the following motors have almost constant speed over their full load range ?
- (a) DC series motors (b) AC series motors
 (c) DC shunt motors
 (d) Low resistance squirrel cage motors
 (e) (c) and (d) both
- 297.** If two wound-rotor induction motors are arranged so that the stator of one is connected to an external source and its rotor output is connected to the other, what will be the input conditions for the other induction motor ?
- (a) The second motor will run at its own slip but at voltage of first motor
 (b) The second motor will run at slip frequency and voltage of first motor
 (c) The second motor will not run
 (d) The second motor will act as frequency converter
- 298.** In the Q. 297, the first motor acts as
- (a) Voltage converter (b) Frequency converter
 (c) Current converter (d) Power converter
- 299.** In the Q. 297, the slip frequency of the second motor
- (a) is the difference between its applied frequency and its frequency of rotation
 (b) is the difference between of slip-frequency first motor and its frequency of rotation
 (c) (a) or (b) (d) None of the above
- 300.** Four speed-torque curves are shown below, which of the curve is drawn for repulsion start induction run



- (a) A (b) B
 (c) C (d) D
- 301.** The torque developed in D.C. motor depends on
- (a) Armature Current (b) Magnetic field
 (c) Magnetic field and Armature Current
 (d) Speed

- 302.** The speed regulation of D.C. motor can be ideally achieved with
- (a) variable excitation to the field of the motor
 - (b) constant excitation to the field of the motor
 - (c) A.C. excitation to the field of the motor
 - (d) no excitation to the field of the motor
- 303.** If the excitation to the field of the D.C. motor is constant then the torque developed in the motor is proportional to
- (a) armature current
 - (b) field current
 - (c) speed
 - (d) magnetic flux
- 304.** For which of the following machine residual magnetism is a requirement to build up voltage output ?
- (a) separately excited generator
 - (b) self-excited generator
 - (c) all A.C. generators
 - (d) none of them
- 305.** What will happen to the d.c. generator if the field winding attains the critical resistance ?
- (a) it will generate maximum voltage
 - (b) it will generate maximum power
 - (c) it will not develop voltage at all
 - (d) none of them
- 306.** Which of the following conditions hold true for paralleling two d.c. generators ?
- (a) their polarities must match
 - (b) their phase sequences must match
 - (c) their polarities and voltages must match
 - (d) (b) and (c) both
- 307.** The armature voltage control is suitable if the d.c. machine is driven at
- (a) constant current
 - (b) constant torque
 - (c) constant speed
 - (d) constant magnetic field
- 308.** Which of the following parameter is controlled to achieve the variable speed of d.c. drive ?
- (a) magnetic field
 - (b) armature resistance
 - (c) voltage
 - (d) none of the above
- 309.** The Ward Leonard method of speed control of d.c. machine controls the speed below or above normal speed in clockwise and anti-clockwise direction.
- (a) true
 - (b) false
- 310.** Which of the following motor one will choose to drive the rotary compressor ?
- (a) Universal motor
 - (b) Synchronous Motor
 - (c) D.C. series motor
 - (d) D.C. shunt motor

- 311.** The electric current in the motor generator
(a) heat only (b) magnetic field only
(c) (a) and (b) (d) power only
- 312.** Which of the following machine will be preferred to charge the batteries ?
(a) Series generator (b) Series motor
(c) Shunt generator (d) Compound generator
(e) Shunt motor (f) None of the above
- 313.** If the speed of a d.c. shunt motor is increased, the back emf of the motor will
(a) decrease (b) increase
(c) remain same (d) increase then decrease
- 314.** The large number of slots in induction motor
(a) provides better overload capacity
(b) reduces overload capacity
(c) provides bigger size of motor
(d) reduces the size of motor
- 315.** The good power factor of an induction motor can be achieved if the average flux density in air gap is
(a) large (b) small
(c) infinity (d) absent
- 316.** Why the d.c. motors are preferred for traction applications ?
(a) The torque is proportional to armature current.
(b) The torque is proportional to square root of armature current.
(c) The speed is inversely proportional to the torque and the torque is proportional to square of armature current.
(d) Torque and speed are inversely proportional to armature current.
- 317.** Which of the following generating machine will offer constant voltage on all loads ?
(a) Separately excited generator
(b) Self-excited generator
(c) Level compound generator
(d) All the above machines
- 318.** The d.c. generator will be preferred if it has
(a) 100% regulation
(b) small
(c) 10% regulation (d) infinity
- 319.** The number of bushings in a transformer can be reduced if
(a) the tappings are provided at the phase ends
(b) the tappings are provided at the high voltage side
(c) the tappings are provided in middle of the transformer
(d) the tappings are provided on the low voltage side

- 320.** Which of the following transformers will use oil natural cooling with tubes ?
(a) 100 kVA (b) 800 kVA
(c) all the above transformers
- 321.** An induction motor with 1000 rpm speed will have
(a) 2 poles (b) 6 poles
(c) 4 poles (d) 8 poles
- 322.** Which of the following equipment will draw the reactive power ?
(a) Electrical iron (b) Tubelight
(c) Three phase motor (d) Rectifier
- 323.** The large number of narrow slots in stator of an a.c. motor is preferred because
(a) it is easier to make narrow slots than wide open slots
(b) large number of narrow slots reduces motor noise
(c) large number of narrow slots reduces noise and tooth pulsation losses
(d) it helps in uniform distribution of flux
- 324.** The number of parallel paths in wave winding of machine is
(a) 4 (b) 6
(c) 2 (d) 8
- 325.** The alternators are normally designed for the torque angle of the order of
(a) 3° to 15° (b) 2 rad to 3 rad
(c) 15° to 30° (d) 1° to 3°
- 326.** Which of the material is used to insulate the segments of commutator ?
(a) Fibre glass (b) Plastic
(c) Mica (d) PVC
- 327.** The brushes of electrical machines are made of
(a) carbon (b) copper
(c) cast iron (d) steel
- 328.** If the resistance of the field winding of d.c. generator is increased, then the output voltage
(a) increases (b) decreases
(c) remains constant
(d) decreases proportional the resistance of field winding
- 329.** Which of the following generation will be preferred if they are required to be run in parallel ?
(a) Series generators
(b) Shunt generators
(c) Shunt and series generators
(d) Compound generators

- 330.** To separately excited motors have
- (a) excitation which is independent of load current
 - (b) the advantage over self excited motor that it can be utilised for zero volt to its maximum rated capacity
 - (c) *a* and *b* both
 - (d) none of them
- 331.** The armature voltage control of dc motor provides
- (a) constant current drive
 - (b) constant voltage drive
 - (c) constant torque drive
 - (d) constant torque drive
- 332.** The field current control of d.c. shunt motor will provide
- (a) constant current drive
 - (b) constant voltage drive
 - (c) constant HP drive
 - (d) constant torque drive
- 333.** Which of the following method of speed control of d.c. machine will offer minimum efficiency ?
- (a) armature control method
 - (b) field control method
 - (c) voltage control method
 - (d) all above methods
- 334.** In which of the following methods of speed control computation is unsatisfactory ?
- (a) field control method
 - (b) voltage control method
 - (c) armature current control method
 - (d) all above methods
- 335.** The dynamic braking can be used for
- (a) series motors
 - (b) shunt motors
 - (c) compound motors
 - (d) all above motors
- 336.** The plugging gives the
- (a) smallest torque braking
 - (b) highest torque braking
 - (c) zero torque braking
 - (d) none of them
- 337.** Which of the method of braking will be selected if the highest braking torque is required ?
- (a) Plugging
 - (b) Dynamic braking
 - (c) Counter current braking
 - (d) Regenerative braking
 - (e) (a) or (c)
- 338.** If the terminals of armature of d.c. machine are interchanged, this action will offer following kind of braking.
- (a) Plugging
 - (b) Regenerative
 - (c) Dynamic braking
 - (d) Any of the above
- 339.** If a d.c. motor designed for 45°C ambient temperature is to be used for 55°C ambient temperature, then the motor
- (a) is to be derated by a factor recommended by manufacturer and select next higher HP motor
 - (b) can be used for 55°C ambient also
 - (c) of lower HP should be selected
 - (d) of high speed should be selected

- 340.** If we have to control the speed of 150 HP d.c. motor from zero to 1000 rpm having rated speed of 1500 rpm. Then it will be preferred to
- (a) select a motor of 150 HP, 1500 r.p.m.
 - (b) select a motor of 1.5×150 HP, 1500 r.p.m.
 - (c) select a motor of 150 HP, 750 r.p.m.
 - (d) select a motor of 75 HP, 1500 r.p.m.
- 341.** For which of the following alternators, the distribution factor will be 0.96 ?
- (a) Three phase alternator, 4 pole wound on 72 slots core
 - (b) Three phase alternator, 8 pole wound on 80 slots core
 - (c) Three phase alternator, 8 pole wound on 72 slots core
 - (d) Three phase alternator, 6 pole wound on 72 slots core
- 342.** Which of the synchronous alternators will complete 1080 electrical degrees in one revolution ?
- (a) 8 pole synchronous alternator
 - (b) 6 pole synchronous alternator
 - (c) 4 pole synchronous alternator
 - (d) 10 pole synchronous alternator
- 343.** How many cycles of alternating current will be generated in one revolution of 8 pole synchronous alternator ?
- (a) 10 cycles
 - (b) 4 cycles
 - (c) 8 cycles
 - (d) 16 cycles
- 344.** How many poles will be required if an alternator runs at 1500 rpm and gives frequency of 50 Hz ?
- (a) 8 poles
 - (b) 6 poles
 - (c) 4 poles
 - (d) 2 poles
- 345.** Two generators are running in parallel. One of the generator may run as motor for following reasons ?
- (a) The speed of that generator is increased
 - (b) The direction that generator is reversed
 - (c) The generator takes large share of loads
 - (d) The field of that generator is weakened
- 346.** Which of the following statements is correct ?
- (a) A single phase induction motor has very high starting torque.
 - (b) A single phase induction motor has zero starting torque.
 - (c) A single phase starting torque is as good as that of 3 phase induction motor.
 - (d) A single phase motor has very small torque but greater than zero.
- 347.** The primary applied voltage in an ideal transformer on no load is balanced by
- (a) primary induced emf
 - (b) secondary induced emf
 - (c) secondary voltage
 - (d) core and copper losses

- 348.** The air cores in transformers are preferred for
- (a) low frequency transformers
 - (b) high frequency transformers
 - (c) 5 kVA, 50 Hz transformers
 - (d) none of these
- 349.** The synchronous motor can be made self starting by providing.
- (a) damper winding on rotor poles
 - (b) damper winding on stator
 - (c) (a) or (b)
 - (d) none of the above
- 350.** The amplidyne is
- (a) fully compensated cross field machine
 - (b) half compensated cross field machine
 - (c) over-compensated cross field machine
 - (d) under-compensated cross field machine