DC Motor Questions and Answers

1. Starters are used with D.C. motors because

(a) these motors have high starting torque.

(b) these motors are not self-starting.

(c) back e.m.f. of these motors is zero initially.

(d) to restrict armature current as there is no back e.m.f. while

starting.

Answer: (d)

2. For starting a D.C. motor a starter is required because

(a) it limits the speed of the motor.

(b) it limits the starting current to a safe value.

(c) it starts the motor.

(d) none of the above.

Answer: (b)

3. The-type of D.C. motor used for shears and punches is

(a) shunt motor.

(b) series motor.

(c) differential compound D.C. motor.

(d) cumulative compound. D.C. motor .

Answer: (d)

4. If D.C. motor is connected across the A.C. supply it will

(a) run at normal speed.

(b) not run.

(c) run at lower speed.

(d) burn due to heat produced in the field winding by eddy currents.

Answer: (d)

5. To get the speed of D.C. motor below the normal without wastage of electrical energy is…………. used.

(a) Ward Leonard control

(b) rheostatic control

(c) any of the above method

(d) none of the above method

Answer: (a)

6. When two D.C. series motors are connected in parallel, the resultant speed is

(a) more than the normal speed

(b) less than the normal speed

(c) normal speed

(d) zero

Answer: (c)

7. The speed of a D.C. shunt motor more than its full-load speed can be obtained by

(a) decreasing the field current.

(b) increasing the field current.

(c) decreasing the armature current.

(d) increasing the armature current.

Answer: (a)

8. In a D.C. shunt motor, speed is

(a) independent of armature current.

(b) directly proportional to the armature current.

(c) proportional to the square of the current.

(d) inversely proportional to the armature current.

Answer: (a)

9. If the speed of a D.C. shunt motor is increased the back e.m.f. of the motor will

(a) decrease.   (b) increase.

(a) remain same.   (d) become zero.

Answer: (b)

10. What will happen if the back e.m.f. of a D.C. motor vanishes suddenly?

(a) The motor will stop.

(b) The motor will continue to run.

(c) The armature may burn.

(d) The motor will run noisy.

Answer: (c)

11. In case of D.C. shunt motors the speed is dependent on back e.m.f. only because

(a) back e.m.f. is equal to armature drop.

(b) armature drop is negligible.

(c) flux is proportional to armature current.

(d) flux is practically constant in D.C. shunt motors.

Answer: (d)

12. In a D.C. shunt motor, under conditions of maximum power, the current in the armature will be

(a) almost negligible.

(b) rated full load current.

(c) less than full-load current.

(d) more than full-load current.

Answer: (d)

13. Which D.C. motor will have least percentage increase of input current for the same percentage increase in torque?

(a) Shunt motor

(b) Series motor

(c) Cumulative compound motor

(d) Separately excited motor

Answer: (c)

14. Which of the following load normally needs starting torque more than the rated torque?

(a) Blowers

(b) Conveyors

(c) Air compressors

(d) Centrifugal pumps

Answer: (b)

15. The starting resistance of a D.C. motor is generally

(a) low.

(b) around 5000 ohms.

(c) 1000 ohms.

(d) infinitely large.

Answer: (a)

16. The speed of a D.C. series motor is

(a) proportional to the armature current.

(b) proportional to the square of the armature current.

(c) proportional to field current.

(d) inversely proportional to the armature current.

Answer: (d)

17. In a D.C. series motor if the armature current is reduced by 50%, the torque of the motor will be equal to

(a) 100% of the previous value.

(b) 50% of the previous value.

(c) 25% of the previous value.

(d) 10% of the previous value.

Answer: (c)

18. The current drawn by the armature of D.C. motor is directly proportional

(a) the torque required.

(b) the speed of the motor.

(c) the voltage across the terminals.

(d) none of the above.

Answer: (a)

19. The power mentioned on the name plate of an electric motor indicates

(a) the power drawn in kW.

(b) the power drawn in kVA.

(c) the gross power.

(d) the output power available at the shaft.

Answer: (d)

20. In Ward Leonard method of speed control of a D.C. motor, change in speed of motor is obtained by the

(a) change in armature voltage of D.C. motor.

(b) change in the field excitation of the D.C. motor.

(c) change in armature current of D.C. motor.

(d) change in supply voltage.

Answer: (a)

21. Which D.C. motor has got maximum self loading property?

(a) Series motor

(b) Shunt motor

(c) Cumulatively compounded motor

(d) Differentially compounded motor

Answer: (d)

22. For the same H.P. rating and full load speed, following motor has poor starting torque

(a) shunt.

(b) series.

(c) differentially compounded.

(d) cumulatively compounded.

Answer: (c)

23. In case of conductively compensated D.C. series motors, the compensating winding is provided

(a) as separately wound unit.

(b) in parallel with armature winding.

(c) in series with armature winding.

(d) in parallel with field winding.

Answer: (c)

24. If the supply voltage for a D.C. motor is increased, which of the following will decrease ?

(a) Starting torque

(b) Operating speed

(c) Full load current

(d) All of the above

Answer: (c)

25. When the speed of a D.C. motor increases

(a) back e.m.f. increases and current drawn decreases.

(b) back e.m.f. as well as current drawn both increase.

(c) back e.m.f. as well as current drawn both decrease.

(d) back e.m.f. decreases and current drawn increases.

Answer: (a)

26. As compared to an induction motor, the air gap in a D.C. motor is

(a) less than 50%.

(b) between 60% and 90%.

(c) same.

(d) more.

Answer: (d)

27. Field winding of a D.C. series motor is usually provided with thick wire

(a) to provide large flux.

(b) to reduce the use of insulating materials.

(c) as it carries large load current.

(d) in order to reduce eddy current.

Answer: (c)

28. The mechanical power developed by a shunt motor will be maximum when the ratio of back e.m.f. to applied voltage is

(a) 4.0   (b) 2.0

(c) 1.0   (d) 0.5

Answer: (d)

29. The condition for maximum power in case of D.C. motor is

(a) back e.m.f. = 2 x supply voltage

(b) back e.m.f. = (½) x supply voltage

(c) supply voltage = (½) x back e.m.f.

(d) supply voltage = back e.m.f.

Answer: (b)

30. For which of the following applications a D.C. motor is preferred over an AC. motor ?

(a) Low speed operation.

(b) High speed operation.

(c) Variable speed operation.

(d) Fixed speed operation.

Answer: (c)

31. The speed of a motor falls from 1100 r.p.m. at no-load to 1050 r.p.m. at rated load. The speed regulation of the motor is

(a) 2.36%   (b) 4.76%

(c) 6.71%   (d) 8.84%

Answer: (b)

32. The armature voltage control of D.C. motor provides

(a) constant torque drive.

(b) constant voltage drive.

(c) constant current drive.

(d) none of the above.

Answer:

33. The speed of a D.C. shunt motor can be increased by

(a) increasing the resistance in armature circuit.

(b) increasing the resistance in field circuit.

(c) reducing the resistance in the field circuit.

(d) reducing the resistance in the armature circuit.

Answer: (b)

34. In case the back e.m.f. and the speed of a D.C. motor are doubled, the torque developed by the motor will

(a) remain unchanged.

(b) reduce to one-fourth value.

(c) increase four folds.

(d) be doubled.

Answer: (a)

35. At the instant of starting when a D.C. motor is put on supply, it behaves like

(a) a highly resistive circuit.

(b) a low resistance circuit.

(c) capacitive circuit.

(d) none of the above.

Answer: (b)

36. Which motor has the poorest speed control?

(a) Differentially compounded motor.

(b) Cumulatively compounded motor.

(c) Shunt motor.

(d) Series motor.

Answer: (d)

37. The plugging gives the

(a) zero torque braking.

(b) smallest torque braking.

(c) highest torque braking.

(d) none of the above.

Answer: (c)

38. If the terminals of armature of D.C. motor are interchanged, this action will offer following kind of braking

(a) regenerative.

(b) plugging.

(c) dynamic braking.

(d) none of the above.

Answer: (b)

39. Which of the following motors is usually used in household refrigerators ?

(a) D.C. shunt motor.

(b) D.C. series motor.

(c) Single phase induction motor (split phase start or induction run motor).

(d) Reluctance motor.

Answer: (c)

40. Ward-Leonard control is basically a

(a) voltage control method.

(b) field diverter method.

(c) fled control method.

(d) armature resistance control method.

Answer: (a)

41. For constant torque drive which speed control method is preferred ?

(a) Field control.

(b) Armature voltage control.

(c) Shunt armature control.

(d) Mechanical loading system.

Answer: (b)

42. In Ward-Leonard control the lower limit of speed is imposed by

(a) residual magnetism of the generator.

(b) core losses of motor.

(c) mechanical losses of motor and generator together.

(d) all of the above.

Answer: (a)

43. The main disadvantage of the Ward Leonard control method is

(a) high initial cost.

(b) high maintenance cost.

(c) low efficiency at light loads.

(d) all of the above.

Answer: (d)

44. The losses occurring in a D.C. generator are given below. Which loss is likely to have the least proportion ?

(a) Magnetic losses.

(b) Armature copper losses.

(c) Mechanical losses.

(d) Field copper losses.

Answer: (c)

45. In a D.C. generator all of the following could be the effects of iron losses except

(a) Loss of efficiency.

(b) Excessive heating of core.

(c) Increase in terminal voltage.

(d) Rise in temperature of ventilating air.

Answer: (c)

46. The losses occurring in a D.C. generator are given below. Which loss is likely to have highest proportion at rated load of the generator ?

(a) hysteresis loss.

(b) field copper loss.

(c) armature copper loss.

(d) eddy current loss.

Answer: (c)

47. If 't' be the thickness of the laminations, then eddy current loss in a generator will vary as

(a) 1/t

(b) t^2

(c) $1/t^2$

Answer: (b)

48. If B_{max} is the maximum flux density, then eddy current loss will vary as

(a) B_{max}

(b) B_{max} 2

 (c) B_{max} $^{1.2}$

(d) B_{max} $^{2.4}$

Answer: (b)

49. The hysteresis loss in a D.C. generator varies with the frequency of magnetic reversals as

(a) 1/f   (b) f

(c) $f^{1.6}$ (d) f^2

Answer: (b)

50. Which of the following methods of braking is used in rolling mills ?

(a) Dynamic braking.

(b) Plugging.

(c) Regenerative braking.

(d) Mechanical brakes.

Answer: (b)

51. Regenerative method of braking is based on that

(a) back e.m.f. is less than the applied voltage.

(b) back e.m.f. is equal to the applied voltage.

(c) back e.m.f. of rotor is more than the applied voltage.

(d) none of the above.

Answer: (c)

52. The retardation test is applicable to shunt motors and generators and is used to find

(a) the copper losses.

(b) the stray losses.

(c) the friction losses.

(d) the eddy current losses.

Answer: (b)

53. Compensating winding in a D.C. machine is placed

(a) on yoke in the pole faces.

(b) on yoke in the interpole gap.

(c) on armature.

(d) none of the above.

Answer: (a)

54. Torque developed by a D.C. motor depends upon

(a) magnetic field.

(b) active length of the conductor.

(c) current flow through the conductors.

(d) number of conductors.

(e) radius of armature.

(f) all above factors.

Answer: (f)

55. In a manual shunt motor starter

(a) over load relay is connected in series and no-volt relay in parallel with the load.

(b) over load relay is connected in parallel and no volt relay in series with the load.

(c) over load relay and no volt relay are both connected in series with the load.

(d) over load relay and no volt relay are both connected in parallel with the load.

Answer: (a)

56. Which of the following steps is likely to result in reduction of hysteresis loss in a D.C. generator ?

(a) Providing laminations in armature core.

(b) Providing laminations in stator.

(c) Using non-magnetic material for frame.

(d) Using material of low hysteresis coefficient for armature core material.

Answer: (d)

57. Which loss in a D.C. generator does not vary with load as well as flux density ?

(a) Copper loss

(b) Eddy current loss

(c) Hysteresis loss

(d) Windage loss

Answer: (d)

58. The total losses in a well designed D.C. generator of 10 kW will be nearly

(a) 100V   (b) 500 W

(c) 1000 W   (d) 1500 W

Answer: (b)

59. The condition for maximum efficiency for a D.C. generator is

(a) eddy current losses = stray losses.

(b) hysteresis losses = eddy current losses.

(c) variable losses = constant losses.

Answer: (c)

60. D.C. generators are normally designed for maximum efficiency around

(a) full-load   (b) rated r.p.m.

 (c) rated voltage   (d) all of the above

Answer: (a)

61. In a D.C. generator, the iron losses mainly take place in

(a) yoke

(b) commutator

(c) armature conductors

(d) armature rotor

Answer: (d)

62. During rheostat braking of D.C. series motors the motor is run

(a) as a generator.

(b) motor is reversed in direction.

(c) motor is run at reduced speed.

Answer: (a)

63. For which type of D.C. motor, dynamic braking is generally used?

(a) Shunt motors

(b) Series motors

(c) Compound motors

(d) All of the above

Answer: (d)

64. During rheostatic braking the braking torque is proportional to

(a) speed

(b) 1/speed

(c) $speed^2$

(d) speed $^{1/2}$

Answer:

65. Which method of braking is generally used in elevators ?

(a) Plugging

(b) Regenerative braking

(c) Rheostatic braking

(d) None of the above

Answer: (a)

66. In variable speed motor

(a) a stronger commutating field is needed at low speed than at high speed.

(b) a weaker commutating field is needed at low speed than at high speed.

(c) same commutating field is needed at low speed than at high speed.

(d) none of the above is correct.

Answer: (b)

67. If a D.C. shunt motor is working at full load and if shunt field circuit suddenly opens

(a) this will make armature to take heavy current, possibly burning it.

(b) this will result in excessive speed possibly destroying armature due to excessive centrifugal stresses.

(c) nothing will happen to motor.

(d) motor will come to stop.

Answer: (a)

68. D.C. motor is to drive a load which has certain minimum value for most of the time and some peak value for short duration. We will select the

(a) series motor

(b) shunt motor

(c) compound motor

(d) any of the above

Answer: (a)

69. D.C. motor is to a drive a load which is almost nil for certain part of the load cycle and peak value for short duration. We will select the

(a) series motor.

(b) shunt motor.

(c) compound motor.

(d) any of the above.

Answer: (c)

70. Which D.C. motor has got maximum self relieving property ?

(a) Series motor.

(b) Shunt motor.

(c) Cumulatively compounded motor.

(d) Differentially compounded motor.

Answer: (a)

71. A 230 V D.C. shunt motor takes 32 A at full load. The back e.m.f. on full load, if the resistance of motor armature and shunt field windings are 0.2 ohms and 115 ohms respectively, will be

(a) 210 V   (b) 215V

(c) 220 V   (d) 224V

Answer: (d)

72. One D.C. motor drives another D.C. motor. The second D.C. motor when excited and driven

(a) runs as a generator.

(b) does not run as a generator.

(c) also runs as a motor.

(d) comes to stop after sometime.

Answer: (a)

73. Which of the following D.C. motors has the least drop in speed between no-load and nominal load ?

(a) Series motor without commutating poles.

(b) Series motor with commutating poles.

(c) Shunt motor with commutating pole.

(d) Compound motor without commutating poles.

Answer: (c)

74. In a D.C. motor if the back e.m.f. is absent,

(a) motor will burn.

(b) motor will not run at all.

(c) motor will run at very slow speed.

(d) motor will run at very high speed.

Answer: (a)

75. What will happen if supply terminals of D.C. shunt motor are interchanged?

(a) The direction of rotation will reverse.

(b) Motor will stop.

(c) Motor will run at speed lower than the normal speed in the same direction.

(d) Motor will run at its normal speed in the same direction as it was running.

Answer: (d)

76. When the electric train is moving down a hill the D.C. motor act as

(a) D.C. series generator.

(b) D.C. shunt generator.

(c) D.C. shunt motor.

(d) D.C. series motor.

Answer: (a)

77. Which of the following methods is most economical for finding the no-load losses of a large D.C. shunt motor ?

(a) Retardation test.

(b) Swinburne's test.

(c) Hopkinson's test.

(d) none of the above.

Answer: (b)

78. Which of the following statement is incorrect ? If a starter is not used with large D.C. motor, it will draw a starting current which

(a) will produce very low starting torque.

(b) will produce excessive line voltage drop.

(c) will damage the commutator.

(d) is many times its full-load current.

Answer: (a)

79. The rated speed of a given D.C. shunt motor is 900 r.p.m. To run this machine at 1000 r.p.m., which of the following speed control scheme will be used?

(a) Ward-Leonard control.

(b) Armature current resistance control.

(c) Field resistance control.

(d) None of the above

Answer: (c)

80. In a DC motor, energy conversion is possible only due to

(a) production of opposing back e.m.f. E_b in the armature.

(b) input energy from supply.

(c) use of commutator.

(d) application of Fleming's left-hand rule.

Answer: (a)

81. The speed of a D.C. motor, under constant load conditions, is affected by

(a) back e.m.f.

(b) field flux.

(c) armature current.

(d) none of the above.

Answer: (b)

82. A series motor is best suited for driving

(a) machine tools.

(b) cranes and hoists.

(c) shear and punches.

(d) none of the above.

Answer: (b)

83. While starting a differential compound motor, it is best to short the series field in order to avoid

(a) excessive starting period.

(b) motor starting in wrong direction.

(c) tripping of the circuit breaker.

(d) large in rush of current.

Answer: (b)

84. In a D.C. motor constant torque is produced due to

(a) rotor laminations.

(b) end-plates.

(c) pole shoes.

(d) commutator.

Answer: (d)

85. The operation of electric generators and motors depend on the interaction between magnetic field and

(a) copper conductors.

(b) electric field.

(c) electric current.

(d) commutator.

Answer: (c)

86. All motors, basically, operate on the principle of either repulsion or

(a) induction.

(b) semi-conduction.

(c) capacitance.

(d) electromagnetism.

Answer: (a)

87. The maximum end-play of a motor is about

(a) 10 mm   (b) 6 mm

(c) 2 mm   (d) 0.4 mm

Answer: (d)

88. If the no-voltage release of a D.C. motor starter fails to work, on resumption of supply after a break, the motor will

(a) not start automatically.

(b) start automatically without trouble.

(c) get damaged.

(d) develop very low torque.

Answer: (c)

89. A D.C. series motor, as compared to shunt and compound motors, has the highest torque at the start because of its comparatively

(a) stronger series field.

(b) lower armature resistance.

(c) larger armature current.

(d) fewer series turns.

Answer: (a)

90. The mechanical power developed by a D.C. motor is equal to

(a) power input + losses

(b) back em.f. x armature current

(c) power output x losses

(d) power output x efficiency

Answer: (b)

91. Between Field's test and Hopkinson's test the main common thing is that both

(a) use negligible power.

(b) are regenerative tests.

(c) need two similar mechanically coupled motors.

(d) need two electrically coupled series motors.

Answer: (c)

92. The use of armature divertor in the rheostatic method of speed control for a D.C. shunt motor makes the method

(a) less expensive.

(b) less wasteful.

(c) suitable for rapidly changing loads.

(d) unsuitable for changing loads.

Answer: (c)

93. The series parallel system of speed control of D.C. series motors widely used in traction work gives a speed range of about

(a) 1:10　　　　(b) 1 : 8

(c) 1: 8　　　　(d) 1 : 4

Answer: (d)

94. If conditions for maximum power for a D.C. motor are established the efficiency of the motor will be

(a) less than 50%

(b) 60 to 70%

(c) 80 to 90%

(d) 100%

Answer: (a)

95. In which of the following tests only one motor is required

(a) Brake test

(b) Hopkinson's test

(c) Field's test

(d) Swinburne's test

Answer: (a)

96. In Field's test for series motors, one motor drives the other machine as

(a) cumulative compound generator.

(b) differential compound generator.

(c) separately excited generator.

(d) series generator.

Answer: (c)

97. A motor for punching machine is usually subjected to

(a) no load.

(b) continuous part toad.

(c) continuous full load.

(d) intermittent load.

Answer: (d)

98. Which of the following is not necessarily the advantage of D.C. motors over A.C. motors ?

(a) Batter speed control

(b) Low cost

(c) High starting torque

(d) Wide speed range

Answer: (b)

99. The armature shaft of a D.C. motor must be able to withstand

(a) any unbalanced magnetic pull on the armature core.

(b) twisting strains due to transmission of torque.

(c) bending moment due to the weight of the armature and commutator.

(d) all of the above.

Answer: (d)

100. In an overloaded motor main danger arises due to

(a) winding getting overheated.

(b) bus-bars getting heated.

(c) starter getting damaged.

(d) bearings getting overheated.

Answer: (a)

101. A wide and very sensitive speed control is usually required in case of

(a) elevators.

(b) steel rolling mills.

(c) colliery winders.

(d) all of the above.

Answer: (d)

102. Regenerative braking on D.C. shunt motors is used when

(a) the load has overhauling characteristics.

(b) the load is variable.

(c) the load also acts as a braking force.

(d) the load is constantly decreasing.

Answer: (a)

103. Which motor should be used for centrifugal pumps?

(a) Series motor

(b) Shunt motor

(c) Either of the above

Answer: (b)

104. Which of the following methods is most effective in finding out the no load losses in a large D.C. shunt motor ?

(a) Field's test

(b) Block rotor test

(c) Swinburne's test

(d) Hopkinson's test

Answer: (c)

105. The main disadvantage of Hopkinson's test for finding efficiency of the shunt D.C. motors is that it

(a) needs one motor and one generator.

(b) require two identical shunt machines.

(c) requires full-load power.

(d) ignores any change in iron loss.

Answer: (b)

106. Which losses can be determined by performing the retardation test ?

(a) Friction losses

(b) Eddy current losses

(c) Stray losses

(c) Copper losses

Answer: (c)

107. The generated e.m.f. and the current are in the opposite direction in case of

(a) D.C. generators

(b) D.C. motors

(c) D.C. generators and D.C. motors

(d) none of the above

Answer: (b)

108. Hopkinson's test is conducted at

(a) no load
(b) part load

(c) low load
(d) full load

Answer: (d)

109. Which of the following tests can be conducted on all types of D.C. machines ?

(a) Hopkinson's test

(b) Running down test

(c) Block rotor test

(d) Field's test

(d) Brake test

Answer: (d)

110. In case of a shunt motor if the supply voltage is increased by 10% which of the following will decrease?

(a) full load current
(b) full load speed

(c) starting torque   (d) none of the above

Answer: (a)

111. Which of the following, in a D.C. motor can sustain the maximum temperature rise?

(a) Commutator   (b) Armature windings

(c) Slip-rings   (d) Field windings

Answer: (d)

112. Speed control by the variation of flux, in a D.C. shunt motor, will give

(a) constant torque drive.

(b) variable torque drive.

(c) constant power drive.

(d) variable power drive.

Answer: (c)

113. A brake test on D.C. motors is usually restricted to

 (a) small horse power motors.

(b) variable speed motors.

(c) high speed motors.

 (d) open frame type motors.

Answer: (a)

114. Which D.C. motor will have least percentage increase of input current for the same percentage increase in the torque?

(a) Shunt motor

(b) Series motor

(c) Cumulative compound motor

(d) Separately excited motor

Answer: (b)

115. In D.C. machines fractional pitch winding is used

(a) to improve cooling.

(b) to reduce copper losses.

(c) to increase the generated e.m.f.

(d) to reduce the sparking.

Answer: (d)

116. A three point starter is considered suitable for

(a) shunt motors.

(b) shunt as well as compound motors.

(c) shunt, compound and series motors.

(d) all D.C. motors.

Answer: (b)

117. Small D.C. motors up to 5 H.P. usually have

(a) 2 poles   (b) 4 poles

(c) 6 poles   (d) 8 poles

Answer: (a)

118. A shearing machine has cyclic load consisting of intermittent light and heavy loads. Which of the following D.C. motor will be suitable for this purpose?

(a) Series motor

(b) Shunt motor

(c) Cumulative compound motor

(d) Differential compound

Answer: (c)

119. The ratio of starting torque to full load torque is least in case of

(a) series motors.

(b) shunt motors.

(c) compound motors.

(d) none of the above.

 Answer: (b)