D.C Machines

Dc Motor

1. What will happen if DC shunt motor is connected across AC supply?
   a) Will run at normal speed
   b) Will not run
   c) Will Run at lower speed
   d) Burn due to heat produced in the field winding

2. What will happen if the back emf of a DC 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

3. What will happen, with the increase in speed of a DC motor?
   a) Back emf increase but line current falls.
   b) Back emf falls and line current increase.
   c) Both back emf as well as line current increase.
   d) Both back emf as well as line current fall.

4. Which part will surely tell that given motor is DC motor and not an AC type?
   a) Winding
   b) Shaft
   c) Commutator
   d) Stator

5. In DC motor, which of the following part can sustain the maximum temperature rise?
   a) Field winding
   b) Commutator
   c) Slip rings
   d) Armature winding

6. Direction of rotation of motor is determined by _____
   a) Faraday's law
   b) Lenz's law
   c) Coulomb's law
   d) Fleming's left-hand rule

7. The current drawn by the armature of DC motor is directly proportional to _____

a) Torque
b) Speed
c) The voltage across the terminals
d) Cannot be determined

8. Which power is mentioned on a name plate of a motor?
   a) Gross power
   b) Power drawn in kVA
   c) Power drawn in kW
   d) Output power available at the shaft

9. An electric motor is having constant output power. So, motor will have a torque speed characteristic _____
   a) Circle about the origin.
   b) Straight line parallel to the speed axis.
   c) Straight line through the origin.
   d) Rectangular hyperbola

10. Which of the following quantity will decrease if supply voltage is increased?
    a) Starting torque
    b) Operating speed
    c) Full-load current
    d) Cannot be determined

11. In which of the following case we will get maximum power?
    a) E_a = 2 x supply voltage
    b) E_a = supply voltage
    c) Supply voltage = 2 x E_a
    d) supply voltage = 4 x E_a

12. Sometimes motor has to be de-rated.
    a) True
    b) False

13. The armature shaft of a DC motor must be able to withstand _____
    a) Bending moment due to weight of the armature.
    b) Any unbalanced magnetic pull on the armature core.
    c) Twisting stains due to transmission of torque.
    d) Bending moment, unbalanced magnetic pull and twisting stains

14. In DC machines the residual magnetism is present. The order of residual magnetism is _____
    a) 2 to 3 per cent
    b) 10 to 15 per cent
    c) 20 to 25 per cent
    d) 50 to 75 per cent

15. Sparking is discouraged in a DC motor.
    a) True
    b) False

16. Which of the following motor is used where high starting torque and wide speed range control is required?
    a) All motors
    b) Induction motor
    c) Synchronous motor
    d) DC motor

17. The armature voltage control of DC motor will provide _____
    a) Constant power drive
    b) Constant voltage drive
    c) Constant current drive
    d) Constant torque drive

18. As there is no back emf at the instant of starting a DC motor, in order to prevent a heavy armature current from flowing though the armature circuit _____
    a) Series resistance is connected with armature
    b) Parallel resistance is connected to the armature
    c) armature is temporarily open circuited
    d) a high value resistor is connected across the field winding

19. What will happen to torque if back emf and speed of the DC motor is doubled?
    a) Remain unchanged
    b) Reduce to one-fourth value
    c) Increase four folds
    d) Be doubled

20. At the instant of starting, when a DC motor is put on supply, it will behave like _____
    a) Highly resistive circuit
    b) Low resistance circuit
    c) Capacitive circuit

d) Inductive circuit

21. All others are advantages of DC motor over AC motor except _____
    a) Low cost
    b) Wide speed range
    c) Stability
    d) High starting torque

22. If a DC motor designed for 45°C ambient temperature is to be used for 55°C ambient temperature, then the motor _____
    a) Of lower HP should be selected
    b) Of higher HP should be selected
    c) Can be used for 50°C ambient temperature also
    d) Is to be de-rated by a factor recommended by manufacturer and select the next higher H.P. motor

23. Torque developed by a DC motor depends upon _____
    a) magnetic field
    b) active length of the conductor
    c) current flow through the conductors
    d) Current, active length, no. of conductors, magnetic field all

24. Which function is performed by counter emf of a DC motor?
    a) Exceeds supply voltage
    b) Aids applied voltage
    c) Helps in energy conversion
    d) Regulates its armature voltage

25. The output power of any electrical (AC or DC) motor is taken from the _____
    a) Field
    b) Coupling mounted on the shaft
    c) Armature
    d) Motor frame

26. Why field winding of a DC series motor is provided with thick wire?
    a) As it carries large load current
    b) To provide large flux
    c) In order to reduce eddy current to provide large flux
    d) To reduce the of insulting materials

27. The starting resistance of a DC shunt motor is generally _____
    a) low
    b) Around 0.5 kΩ
    c) Around 5 kΩ
    d) Infinitely large

28. What will happen if DC motor is used without starter?
    a) Heavy sparking at brushes
    b) It'll start smoothly
    c) Will not start at all
    d) Depends on load

29. Motor will start quickly when used without starter.
    a) **True**
    b) False

30. The efficiency of the DC motor at maximum power will be _____
    a) 100%
    b) Around 90%
    c) Anywhere between 75% and 90%
    d) Less than 50%

31. The hysteresis loss in a DC machine least depends on _____
    a) Frequency of magnetic reversals
    b) Maximum value of flux density
    c) Volume and grade of iron
    d) Rate of flow of ventilating air

32. The condition for maximum efficiency for a DC motor is _____
    a) Eddy current losses = stray losses
    b) Hysteresis losses = eddy current losses
    c) Copper losses = 0
    d) Variable losses = constant losses

33. The condition for maximum efficiency for a DC motor is variable losses equal to constant losses.
    True

34. The condition for maximum efficiency for a DC motor is eddy current losses equal to constant losses. – False

35. Motor will start quickly when used with starter – True
    .
36. In the DC motor the iron losses occur in _____
    a) Field
    b) Rotor
    c) Brushes
    d) Commutator

37. In the DC motor the iron losses occur in Rotor- true

38. In the DC motor the iron losses occur in commutator- False

39. Variable losses are proportional to _____
    a) Armature current
    b) Square of armature current
    c) Inverse of armature current
    d) Inverse of square of armature current

40. Variable losses are proportional to square of armature current – true

41. Variable losses are proportional to armature current- False

42. DC motor is used where high starting torque and wide speed range control is required – true

43. Synchronous motor is used where high starting torque and wide speed range control is required- false

44. Direction of rotation of motor is determined by Fleming's left hand rule-true

45. Direction of rotation of motor is determined by Fleming's right hand rule- False

46. In the traction Dc series motor is used – true

47. In the traction Dc shunt motor is used – false

48. If the no load speed of DC motor is 1300 rpm and full load speed is 1100 rpm, then its voltage regulation is _____
    a. 12.56%
    b. 18.18 %
    c. 17.39%

d. 18.39%

49. . A 4-pole wave wound DC motor drawing an armature current of 20 A has provided with 360 armature conductors. If the flux per pole is 0.015 Wb then the torque developed by the armature of motor is _____
a. 10.23 N-m
b. 34.37 N-m
c. 17.17 N-m
d. 19.08 N-m

50. For a constant emf, if field current is reduced then the speed of the DC motor will_____
a) Remains same
b) Increases
c) Decreases
d) Can’t say

Testing of Dc Motor

1. Swinburne's test can be carried out on all DC motors.
   a) True
   b) False

2. Swinburne's test can be carried out on Dc shunt and compound motor- true

3. Swinburne's test is a no load test – true

4. Swinburne's test is load test – false

5. Swinburne's test can be carried out on dc series motor – false

6. Which of the following test will be suitable for testing two similar DC series motors of large capacity?
   a) Swinburne's test
   b) Hopkinson's test
   c) Field test
   d) Brake test

7. Which losses can be identified from Swinburne's test?
   a) No-load core loss
   b) Windage and friction loss
   c) No-load and windage and friction loss
   d) Stray load loss

8. No-load, windage and friction losses can be identified from Swinburne's test – true

9. Stray load loss can be identified from Swinburne's test – False

10. While carrying out Swinburne's test at rated armature voltage motor will run at _____
    a) Speed equal to rated speed
    b) Speed greater than rated speed
    c) Speed less than rated speed
    d) Can run anywhere

11. In order to run motor on rated speed while carrying out Swinburne's test we add _____
    a) Resistance in parallel with armature

b) Resistance in series with armature
c) Inductor in series with armature
d) Capacitor in parallel with armature

12. What is the purpose of performing retardation test after Swinburne's test?
a) To find stray load loss
b) To find variable losses
c) To separate out windage and friction losses
d) To find shunt field losses

13. Efficiency calculated by Swinburne's test is _____
a) Exactly equal
b) Over-estimated
c) Under-estimated
d) Depends on the manual errors

14. Efficiency calculated by Swinburne's test is Over-estimated – true

15. Efficiency calculated by Swinburne's test is under-estimated – false

16. Which of the following is not a disadvantage of a Swinburne's test?
a) The stray-load losses can't be determined by this test
b) Steady temperature rise can't be determined
c) Does not give results about satisfactory commutation
d) Machine gets damaged

17. While carrying out retardation test, if t is equal to time constant then _____
a) Speed increases to 36.8% of its initial value
b) Speed reduces to 36.8% of its initial value
c) Speed reduces to 26.8% of its initial value
d) Speed reduces to 46.8% of its initial value

18. In retardation test _____
a) Motor switch is made ON and various speed readings are taken
b) At rated speed various speed readings are taken out at different times
c) Motor switch is made OFF at rated speed and various speed readings are taken
d) Some readings are taken while speed is building up and some readings while speed is lowering down

19. In retardation test Motor switch is made OFF at rated speed and various speed readings are taken – true

20. In retardation test Motor switch is made ON and various speed readings are taken – false

21. Retardation curve is _____
    a) Starting from origin
    b) Starts from some positive value and increasing
    c) Starts from some positive curve and stays constant
    d) Starts from some positive value and decreases

22. Retardation curve is starting from origin – false

23. Retardation curve is starts from some positive value and decreases- true

24. Brake test is direct method of testing- true

25. Brake test is indirect method of testing - false

26. Swinburne's test is direct method of testing- false

27. Hopkinson's test of D.C. machines is conducted at _____
    a) No-load
    b) Part load
    c) Full-load
    d) Overload

28. Hopkinson's test of D.C. machines is conducted at full load – true

29. Hopkinson's test of D.C. machines is conducted at over load – false

30. Hopkinson's test requires _____
    a) One DC machine on which test is carried out
    b) Two different DC machines
    c) Two identical DC machines
    d) Can be worked with one or two machines

31. Two identical DC machines required in Hopkinson's test – true

32. Two different DC machines required in Hopkinson's test – false

33. In Hopkinson's test, two machines are connected in _____
    a) Series
    b) Parallel
    c) Can be connected in parallel or series
    d) Two machines are not required

34. In Hopkinson's test, two machines are connected in series. – false

35. In Hopkinson's test, two machines are connected in parallel as well as series – false

36. What will happen if field current of generator in Hopkinson's test is increased?
    a) Current through motor armature will increase
    b) Current through motor armature will decrease
    c) Current through motor armature will remain constant
    d) Motor armature current cannot be determined

37. What will happen if field current of motor in Hopkinson's test is decreased?
    a) Current through motor armature will increase
    b) Current through motor armature will decrease
    c) Current through motor armature will remain constant
    d) Motor armature current can't be determined

38. Hopkinson's test is a regenerative test.- true

39. Hopkinson's test is not a regenerative test.- false

40. For carrying out load test on Hopkinson's test setup _____
    a) Actual load is needed
    b) By changing field currents in two machines load can be changed
    c) Can't carry out
    d) By changing the armature current test is carried out

41. Hopkinson's test gives _____
    a) Combined iron losses of two machines which can be separated
    b) Combined iron losses of two machines which can't be separated
    c) Doesn't include iron losses
    d) Depends on actual setup

42. Hopkinson’s test results depends on actual setup – true

43. Hopkinson’s test is suitable for _____
    a) Small machines only
    b) Small and medium machines
    c) All machines
    d) Only large machines

44. Hopkinson’s test is suitable for small machines – true

45. Hopkinson’s test is suitable for large generator and motor – true

46. Why field test is conducted even if Hopkinson’s test is present?
    a) Instability of an operation
    b) Possibility of run-away speed
    c) Both instability and possibility of run-away speed
    d) Field test is not conducted

47. In field’s test generator field and motor field are connected in _____
    a) Series
    b) Parallel
    c) Alternatively, series and parallel
    d) Not connected

48. Brake test is also known as retardation test - false

49. Brake test gives the result of voltage regulation. – false

50. dw/dt test is also known as retardation test – true

Speed control of dc motor

1. The speed of a DC 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

2. What will happen if excitation of DC shunt motor is changed?
   a) Torque will remain constant
   b) Torque and power both will change
   c) Torque will change but power will remain constant
   d) Torque, power and speed, all will change

3. The speed of a DC shunt motor can be made more than full load speed by _____
   a) Reducing the field current
   b) Decreasing the armature current
   c) Increasing the armature current
   d) Increasing the excitation current

4. The speed of a DC shunt motor can be made more than full load speed by reducing the field current – true

5. The speed of a DC shunt motor can be made more than full load speed by Increasing the armature current – false

6. Speed regulation of DC shunt motor is calculated by ratio of difference of full load speed and no-load speed with full load speed.
   a) True
   b) **False**

7. Which speeds can be obtained from field control of DC shunt motor?
   a) Lower than rated speeds
   b) Greater than rated speeds
   c) Lower and greater than rated speeds
   d) Neither lower nor greater than rated speeds

8. No load speed of the DC shunt motor is 1322 rpm while full load speed is 1182 rpm. What will be the speed regulation?

a) 12.82 %
b) 11.8 %
c) 16.6 %
d) 14.2 %

9. Speed regulation of a DC shunt motor is equal to 10%, at no load speed of 1400 rpm. What is the full load speed?
   a) 1233 rpm
   b) 1273 rpm
   c) 1173 rpm
   d) 1123 rpm

10. Where will speed-torque characteristics will lie when armature reaction is considered?
    a) Below the speed-torque characteristics when armature reaction is not considered
    b) Above the speed-torque characteristics when armature reaction is not considered
    c) On the speed-torque characteristics when armature reaction is not considered
    d) Can be anywhere with the speed-torque characteristics when armature reaction is not considered

11. Working range of the speed-torque characteristic, with increasing speed will _____
    a) Reduce
    b) Increase
    c) Remain same
    d) Cannot comment

12. For speed x rpm, we get field current I_{f1} and for speed y rpm, we get the field current I_{f2}. If y is greater than x then, _____
    a) $I_{f1} <i_{f2}$
    b) $If1 >I_{f2}$
    c) $I_{f1} =I_{f2}$
    d) Cannot comment on I_{f1}, I_{f2}</i

13. 400-V dc shunt motor takes a current of 5.6 A on no-load and 68.3 A on full-load. Armature reaction weakens the field by 3%. What is the ratio of full-load speed to no-load speed? Given: Ra = 0.18 Ω, brush voltage drop= 2 V, R_f = 200 Ω.

a) 1.2
b) 0.8
c) 1.4
d) 1

14. In which of the following method, effect of armature reaction is more?
    a) Field weakening method
    b) Armature resistance control
    c) Same in both methods
    d) Cannot be determined

15. Which of the following DC motor has the poorest speed control?
    a) Differentially compounded motor
    b) Cumulatively compounded motor
    c) Shunt motor
    d) Series motor

16. In variable speed motor _____
    a) Stronger commutating field is needed at low speed than at high speed
    b) Weaker commutating field is needed at low speed than at high speed
    c) Same commutating field is needed at low speed and at high speed
    d) Cannot be determined

17. The speed of a motor falls from 1200 rpm at no-load to 1050 rpm at rated load. The speed regulation of the motor is _____
    a) 12.36%
    b) 14.28%
    c) 16.77%
    d) 18.84%

18. Which of the following is not the method of speed control in DC series motor?
    a) Diverter
    b) Tapped-field control
    c) Variable resistance in series with armature
    d) Series- parallel control

19. For speed reversal, field control method is suitable.
    a) True
    b) False

20. For large motors what is the ratio of compensating winding is required for increasing the speed of the motor?
    a) 2:1
    b) 4:1
    c) 6:1
    d) 8:1

21. In diverter resistor field control method of DC series motor, variable resistor is added _____
    a) In parallel with field
    b) In series with field
    c) In parallel with armature
    d) In parallel with load

22. In diverter resistor field control method of DC series motor, variable resistor is added in series with field – false

23. Why it is advisable to use inductively wound diverter resistor?
    a) To make speed control on more range
    b) For long-life of machine
    c) Cost efficient
    d) To avoid oscillations in speed

24. For higher diverter resistance, speed-torque characteristic will lie _____
    a) Above speed-torque characteristic of lower resistance
    b) Below speed-torque characteristic of lower resistance
    c) On the speed-torque characteristic of lower resistance
    d) Cannot say

25. In tapped field control method _____
    a) A variable resistor is connected in parallel
    b) A variable resistor is connected in series
    c) Field winding is made with more out pins
    d) Another field winding is added with the previous one

26. Which of the following method will not give many speed values for a DC series motor?
    a) Diverter
    b) Series-parallel
    c) Field tapped

d) All field control methods will give many speed values

27. In series-parallel speed control method _____
a) Speed given by parallel connection is more
b) Speed given by series connection is more
c) Both speeds can be equal
d) Will depend on other parameters

28. Where diverters are used?
a) In shunt motors
b) In series motors
c) In both motors
d) All other motors except shunt and series motors

29. Diverters are used in shunt motors – false

30. What will happen to the speed of a series motor if the temperature of armature resistance is increased?
a) Not change
b) Decreases
c) Increases
d) Cannot be determined

31. For which speed control method we get minimum efficiency?
a) Voltage control method
b) Field control method
c) Armature control method
d) Cannot be determined

32. The speed of a DC motor can be varied by changing _____
a) Field current
b) Applied voltage
c) Resistance in series with armature
d) Field current, applied voltage or resistance in series with armature any method will work

33. For constant torque drive which of the following speed control method is preferred?
a) Field control
b) Armature voltage control

c) Shunt armature control
d) Voltage control

34. When the armature of a DC motor rotates, emf induced is in machine is called as _____
a) Self-induced emf
b) Mutually induced emf
c) Back emf
d) Cannot be determined

35. Which of the following method is used for DC motor with 12+ HP requiring frequent start, stop, speed reversal?
a) Drum type controller is used
b) Three-point starter is used
c) Four-point starter is used
d) Cannot be determined

36. Flux density distribution is distorted by armature control method. – false

37. In rheostatic series control method of armature we add _____
a) Variable resistor in parallel with armature
b) Variable resistor in series with armature
a) Fixed resistor in parallel with armature
b) Fixed resistor in series with armature

38. By series armature resistance method, we can get _____
a) Speed above rated speed
b) Speed equal to rated speed
c) Speed below rated speed
d) All speeds are possible

39. By series armature resistance method, we can get Speed above rated speed – false

40. Speed regulation of armature series control method is _____
a) Very good
b) Zero
c) Poor

d) Cannot comment

41. Speed regulation of armature series control method is very good – false

42. In shunted rheostatic armature control method _____
    a) Variable resistor is added in parallel with armature
    b) Variable resistor is added in series with armature
    c) Variable resistor is added in parallel with armature and another variable resistor is added in series
    d) Variable resistor is not added in whole circuit

43. Which of the following is correct statement?
    a) Speed regulation of rheostatic armature control method is better than that of shunted armature control
    a) Speed regulation of rheostatic armature control method is worse than that of shunted armature control
    a) Speed regulation of rheostatic armature control method is almost equal to that of shunted armature control
    a) Speed regulation of rheostatic armature control method and of shunted armature control are equally worst.

44. Speed regulation of rheostatic armature control method is better than that of shunted armature control – false

45. Speed regulation of rheostatic armature control method is almost equal to that of shunted armature control – false

46. Speed regulation of rheostatic armature control method and of shunted armature control are equally worst. – false

47. By series parallel method of armature control how many different speeds are possible?
    a) 4
    b) 8
    c) 2
    d) Infinite

48. Which of the following is the best braking method?
    a) Friction

b) Electromechanical action
c) Eddy-currents
d) Electric braking

49. DC motor is still widely used in industries due to its excellent braking properties.
a) True
b) False

50. Plugging is used in _____
a) Small motors only
b) Small and medium powered
c) Only in large heavy machines
d) Everywhere