Transformers and DC machines questions

1) In T-T connection, the ratio of actual capacity to the available capacity is

a. 1
b. 0.928
c. 1.928
d. 0.5

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2) Whether the given autotransformer is step up or step down, its VA rating is always

a. Greater than the two winding transformer
b. Equal to the two winding transformer
c. lesser than the two winding transformer
d. cannot say

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3) In an autotransformer if the power transferred inductively is equal to the power conducted through, then transformation ratio is given by

a. 1
b. 0.5
c. 2
d. 0

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4) In a 5 kV / 400V, 75 kVA single phase transformer, the current flowing in the primary winding of transformer is 10A. what will be the current flowing in the secondary winding?

a. 100A
b. 120A
c. 125A
d. 130A

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5) If a two winding transformer is converted into an autotransformer by applying additive polarity and subtractive polarity which results in the secondary voltages of 1840 and 1810 volts Then the primary and secondary voltages of transformer are

a. 1800V, 50V
b. 1810V, 40V
c. 1820V, 30V
d. 1825V, 15V

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6) A star connected three phase transformer is provided with tertiary delta connected winding which allows the flow of

a. Second harmonic of exciting current
b. Third harmonic of exciting current
c. Fifth harmonic of exciting current
d. Seventh harmonic of exciting current

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7) A 600 kVA transformer has iron losses of 400 kW and copper losses of 500 kW. Its kVA rating for maximum efficiency is given by

a. 537 kVA
b. 548 kVA
c. 555 kVA
d. 585 kVA

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8) If an autotransformer having transformation ratio equal to 0.6 is supplying a load of 8kw then its power transferred from primary to secondary is given by

a. 3 kW
b. 3.2 kW
c. 3.4 kW
d. 3.5 kW

9) In a step down autotransformer, if the transformation ratio increases then the saving of copper

a. Increases
b. Decreases
c. Remains same
d. None of these

10) A 500 kVA single phase transformer has 90% efficiency at both half load and full load at unity power factor. Then iron losses will be

a. 12.55 KW
b. 13.55 kW
c. 16.55 kW
d. 18.55 KW

11) In a 20 kVA, 2200 / 220 volts transformer iron and copper losses are 300 and 400 watts respectively. Its efficiency at half load and unity power factor is

a. 95.11%
b. 96.15%
c. 97.77%
d. 98%

12) When a resistance is to be transferred from primary to secondary side of transformer with the turns ratio as k, it must be

a. Multiplied by k ∧ 2
b. Multiplied by k
c. Divided by k
d. Divided by k ∧ 2

13) If K is the transformation ratio of step up autotransformer and W_{tw} is the total weight of copper in two winding transformer. Then the saving of copper is given by

a. $K \, W_{tw}$
b. W_{tw}/ K
c. $W_{tw}/ K \wedge 2$
d. $K^2 \, W_{tw}$

14) The most commonly used connections for power systems as a step - up and step - down transformers are

a. Star - delta, star - star
b. Delta - star, star - delta
c. Star - star, delta - delta
d. Star - delta, delta - star

15) A transformer when connected to a 230V, 50Hz supply, under no load draws a current of 4A at a power factor of 0.2 lagging. The magnetizing current (I_m) and core loss (P_c) is equal to

a. 3.919A, 184W
b. 1.84A, 391.9W
c. 39.19A, 184W
d. 3A, 180W

16) A differential relay comparator used for the protection of three phase transformers has

a. One comparator
b. Two comparator
c. Three comparator
d. Six comparator

17) For a single phase no load transformer, which among the following losses will be minimum?

a. hysteresis losses
b. eddy current losses
c. copper losses
d. mechanical losses

18) In double delta transformation, a double delta refers to the case where there are two delta transformations in

a. Parallel
b. Series
c. Both series and parallel
d. Neither series nor parallel

19) Most familiar application of zig - zag transformer is as

a. Ground reference on an ungrounded system
b. Converting single phase to two phase
c. Reducing harmonics
d. All of these

20) In a single phase, full wave bridge circuit and in three phase, delta full wave bridge circuit, the ripple voltage frequency is always

a. Twice the line frequency, six times the line frequency
b. Both will be twice the line frequency
c. Both will be six times the lines frequency
d. None of these

21) In Scott connection, the voltage across the teaser leads the mains by

a. 30 degree
b. 60 degree
c. 90 degree
d. 120 degree

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22) Scott connection is used for the conversion of

a. Single phase to three phase
b. Three phase to single phase
c. Single phase to two phase
d. All of these

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23) In T-T connection, the percentage tapping of main transformer and teaser transformer are

a. 50%, 86.6%
b. 50%, 50%
c. 86.6%, 86.6%
d. 86.6%, 50%

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24) With a bank of two single phase transformers connected in V - V fashion supplying a balanced three phase load with Cosφ as power factor. The power factor of the two transformers is given by

a. Cosφ , Cosφ
b. Cosφ, Cos(30+φ)
c. Cos(30-φ), Cos(30+φ)
d. Cos(30-φ), Cosφ

25) The average power factor at which V-V bank is operating is less than that with the load. Th
power factor is

a. 57.7% of the balanced load power factor
b. 66.7% of the balanced load power factor
c. 86.6% of the balanced load power factor
d. None of theses

26) Consider three transformers connected in delta-delta fashion and supplying their rated load. Now if one of the transformer is removed then each of the remaining two transformer is overloaded. The overload on each transformer is given as

a. 1
b. 1.232
c. 1.732
d. 1.872

27) The load carried by V - V connection is

a. 47.7% of the original load
b. 57.7% of the original load
c. 67.7% of the original load
d. 87.7% of the original load

28) In case of delta-star connection of three phase transformer, secondary line voltage with respect of primary line voltage is at

a. 0 degree
b. 30 degree leading
c. 30 degree lagging
d. 60 degree lagging

29) For large low voltage transformers, the most commonly used connections are

a. Star - star connection
b. Delta - delta connection
c. V connection
d. All of these

30) If K is the transformation ratio, then the secondary phase voltage of delta-delta connected three phase transformer will be

a. 1 / K times of the primary phase voltage
b. Equal to the primary phase voltage
c. 1 / K ∧ 2 times of the primary phase voltage
d. K times the primary phase voltage

31) If a portion of armature current is diverted through the diverter resistance, then the speed of d.c. series motor

a. Remains same
b. Increases
c. Decreases
d. None of these

32) With the increase in temperature, the speed of series and shunt motor will

a. Increase, decrease
b. Decrease, increase
c. Increase, increase
d. Decrease, decrease

33) Speed of d.c. shunt motors are controlled by

a. Flux control method
b. Rheostatic control method
c. Voltage control method
d. All of these

34) Due to armature reaction magnetic neutral axis gets shifted by some angle. In case of motors the brushes are shifted

a. Forwards same as the direction of rotation
b. Backwards opposite to the direction of rotation
c. Either (a) or (b)
**d.** Does not get shifted

35) In electric traction, which type of motor is generally used?

a. Shunt motor
b. Series motor
c. Cumulative compound motor
d. Differential compound motor

36) In a differential compound d.c. motor, with increase in load, speed

a. Increases
b. Decreases
c. Remains same
d. None of these

37) The speed current characteristics are shown in the given figure. Identify the different curves.

armature current
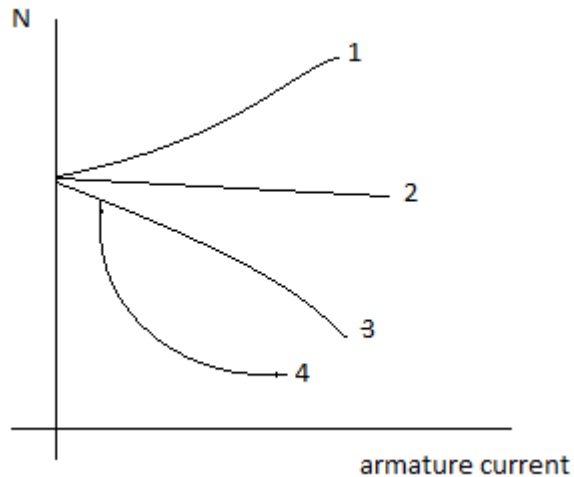
a. 1 – series, 2 – shunt, 3 – cumulative compound, 4 – differential compound
b. 1 – cumulative compound, 2 – differential compound, 3 – series, 4 – shunt
c. 1 – cumulative compound, 2 – differential compound, 3 – shunt, 4 – series
d. 1 – differential compound, 2 – shunt, 3 – cumulative compound 4 – series

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38) Cumulative compound motor is capable of developing large amount of torque at low speeds just like series motor. Can cumulative compound motor be run on light load or no load?

a. Yes
b. No

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39) A long shunt compound motor and a short shunt compound motor can be

a. Cumulative type, differential type
b. Differential type, cumulative type
c. Both can be either cumulative or differential type
d. None of these

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40) D.C. series motors are used in electric traction. What happens to the speed and current of

d.c motor if there is sudden slight drop in the mains voltage?

a. Speed decreases and current also decreases
b. Speed decreases and current increases
c. Speed increases and current decreases
d. Speed decreases and current remains same

41) If a d.c. series motor is started on very light load or on no load then

a. It will run at dangerously high speed which may damage the motor mechanically
b. It will run at very low speed
c. Load does not effect the speed of d.c. series motor
d. None of these

42) The speed armature current characteristics of a d.c. series motor is

a. Rectangular hyperbola
b. Linear
c. Parabolic
d. Parabolic till saturation and then linear

43) The speed of a d.c. series motor is

a. Directly proportional to the both armature current and torque developed
b. Inversely proportional to the armature current and square root of torque developed
c. Directly proportional to the square of the armature current and square root of torque developed
d. Inversely proportional to the square of the armature current and square of torque developed

44) The starting torque developed in the d.c. series motor and in d.c. shunt motor is

a. High, low
b. High, moderate
c. Moderate, low

d. Moderate, high

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45) A 4 pole 240 V, d.c. series motor has a wave wound armature with 180 conductors. The armature resistance and the field winding resistance are 0.10 ohm and 0.2 ohm respectively. If the motor is drawing 40 A current at 0.015 Wb flux per pole, then the speed under this conditio is

a. 2533.3 rpm
b. 2644.4 rpm
c. 2756.9 rpm
d. 2987.6 rpm

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46) Neglecting saturation, if the current drawn from by a d.c. series motor is increased from 15 A to 18 A, then the increase in the torque expressed as percentage of initial torque will be

a. 22 %
b. 33%
c. 44%
d. 56.78%

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47) For d.c. series motor, if I_a is the armature current then the torque developed is

a. $\alpha\ I_a$
b. $\alpha\ I_a^2$
c. $\alpha\ (1 / I_a^2)$
d. $\alpha\ (1 / I_a)$

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48) A 4 pole, 220 V, 10 H.P, d.c. shunt motor is rotating at a speed of 320 rpm. Then the developed useful torque is

a. 210.647 N-m
b. 215.547 N-m
c. 219.484 N-m
d. None of these

49) For a constant torque load, if the armature resistance of shunt motor is doubled (keeping the shunt field constant) then the armature current will

a. Double
b. Get halved
c. Remain same
d. None of these

50) The torque developed in d.c. shunt motor is

a. Directly proportional to the armature current
b. Directly proportional to the square of the armature current
c. Inversely proportional to the armature current
d. Inversely proportional to the square of armature current

51) D.C. shunt motor is also called as

a. Constant flux motor
b. Constant voltage motor
c. Variable voltage motor
d. Constant current motor

52) Keeping the field excitation constant, the constant of proportionality between back emf an armature speed of d.c. motor is

a. Twice of the proportionality constant between developed torque and armature current
b. Half of the proportionality constant between developed torque and armature current
c. Same as that of proportionality constant between developed torque and armature current
d. None of these

53) If the back emf of a d.c. motor is doubled and flux is halved (keeping other parameters

constant) then its speed will become

a. Double of the original speed
b. Square of the original speed
c. Four times of the original speed
d. Half of the original speed

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54) As the load on d.c. motor increases, the current drawn by motor

a. Increases
b. Decreases
c. Remains same
d. None of these

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55) If the no load speed of d.c. motor is 1350 rpm and full load speed is 1150 rpm, then its voltage regulation is

a. 11.56 %
b. 15.36 %
c. 17.39 %
d. 19.39 %

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56) A 4 pole, lap wound d.c. motor drawing an armature current of 20 A has 360 conductors. If the flux per pole is 0.015 Wb then the gross torque developed by the armature of motor is

a. 10.23 N-m
b. 15.56 N-m
c. 17.17 N-m
d. 19.08 N-m

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57) If E_b is the back emf of d.c. motor and V is the terminal voltage, then the condition for

maximum power is

a. $E_b = V$
b. $E_b = 2V$
c. $E_b = (V / 2)$
d. $E_b = V \wedge 2$

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58) If the flux is increased by 50% and speed is reduced by 50% of a d.c. motor (keeping the other parameters constant), then its back emf will become

a. 50 % of the original back emf
b. 0.75 % of the original back emf
c. 100 % of the original back emf
d. 150 % of the original back emf

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59) A 220 V, d.c. motor draws an armature current of 20 A. Its armature resistance is 0.6 ohm. Then the induced emf in the motor will be

a. 195 V
b. 202 V
c. 208 V
d. 215 V

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60) In a practical motor, to reverse the direction of rotation

a. Reverse the direction of main field produced by the field winding
b. Reverse the direction of current passing through the armature is reversed
c. Either (a) or (b)
d. None of these