TWO Marks.

UNIT - I

1. State ohm's law for magnetic circuit. (April/May 2019)

It states that the magneto motive force across the magnetic element is equal to the product of the magnetic flux through the magnetic element and the reluctance of the magnetic material. It is given by

MMF = Flux X Reluctance.

2. Define Leakage Flux. (May/June 2016)

The flux set up in the air paths around the magnetic material is known as leakage flux.

3. Define magnetic reluctance.

The opposition offered by the magnetic circuit for the magnetic flux path is known as magnetic reluctance. It is analogous to electric resistance.

4. What is fringing?

In the air gap the magnetic flux fringes out into neighboring air paths

due to reluctance of air gap which causes a non uniform flux density in the air gap of a machine. This effect is called fringing effect.

5. State stacking Factor

The stacking factor is defined as the ratio of the net cross sectional area of a magnetic core to the cross sectional area of the magnetic core.

The value of stacking factor is always less than unity.

6. Mention some magnetic materials. (April/May-2015)

Alnico, chromium steels, copper-nickel alloy, nickel, cobalt, tungsten and aluminium.

7. What is magnetostriction?

When ferromagnetic materials are subjected to magnetizing mmf. These may undergo small changes in dimension, this phenomenon is known as magnetostriction.

8. Define statically induced emf. (April/May 2015)

The coil remains stationary with respect to flux, but the flux through it changes with time. The emf induced is known as statically induced emf.

9. Define dynamically induced emf.

Flux density distribution remains constant and stationary but the coil move relative to it. The emf induced is known as dynamically induced emf.

10. What are the losses called as core loss. What are the type of magnetic losses? (April/May 2018)

i. Hysteresis loss

ii. Eddy current loss.

11. Define Coercivity.

It is the measure of mmf, which when applied to the magnetic circuit would reduce its flux density to zero. ie it demagnetizes the magnetic circuit.

12. Write the relationship between magneto motive force and magnetic field intensity.
(Nov/Dec 2018)

Magneto motive Force (mmf)

$mmf = NI$ → Ampere turns.

Field strength (H)

$$H = \frac{NI}{L}$$

The relationship between mmf and H is

$$\boxed{H = \frac{mmf}{L}}$$

13. Why magnetic core of a transformer is producing noise in audible band width.
(Nov/Dec 2018)

The basic cause of transformer noise is magnetostriction, the expansion and contraction of the iron core due to the magnetic effect of alternation current flowing through the transformer coils. This produces an audible hum.

14. How are hysteresis and eddy current losses minimized ?
(April/May 2018)

⇒ Hysteresis losses can be reduced by special core material.

⇒ Eddy current losses can be reduced by making core by thin sheet by reducing area of each eddy current branch.

15. Define relative permeability. (April/May 2017)

The relative permeability of the material is the ratio of the permeability of any medium to the permeability of air or vacuum. It is expressed as,

$$\mu_r = \frac{\mu}{\mu_0}$$

where μ_r → relative permeability
μ_0 → Permeability in free space.
μ → magnetic permeability

16. Define magnetic permeability?

It is defined as the property of the material to allow the magnetic line of force to pass through it.

SI unit → Henry per meter. (or)
Newton per ampere square. (N/A^2)

17. Give the expression for hysteresis and eddy current losses. (April/May 2017)

Eddy current loss $P_e = k_e B_{max}^2 f^2 t^2 V$

Hysteresis loss $P_h = \eta B_{max}^n . f . V$

where, η = steinmetz hysteresis co-efficients (J/m3)
B_{max} = magnetic flux density (wb/m^2)
f = frequency (Hz)
n = steinmetz exponent.
V = Volume of magnetic material (m^3)
k_e = eddy current constant.
t = material thickness

18. Define Flux linkage. (Nov/Dec 2016.)

Flux linkage is the linking of the magnetic field with the conductor of the coil when the magnetic field passes through the loops of the coil.

$$\lambda = N\phi$$

19. Define Coefficient of coupling. (April/May 2019)

The fraction of magnetic flux produced by the current in one coil that links with the other coil is called co-efficient of coupling.

$$M = \sqrt{L_1 L_2}$$

UNIT - II

TWO MARKS

1. Specify the role of interpoles in DC Machine

In modern d.c machine commutating poles or interpoles are provided to improve commutation.

2. What is the basic principle of DC generator?

According to Faraday's law of electromagnetic induction is whenever a conductor is moved in a magnetic field, dynamically induced emf is produced in that conductor.

3. Why is the emf not zero when the field current is reduced to zero in a dc generator? (A/M - 2019)

Even after the field current is reduced to zero, the machine is left out with some flux as residue so emf is available due to residual flux.

4. Under what circumstance does a dc shunt generator fail to generate? (A/M-2019)

1. No residual magnetism of field
2. open field connection.
3. Field connection reversed.
4. Field circuit resistance too high.

5. what is meant by armature reaction?

The term Armature reaction means the Effect of the mmf set up by the armature current on the distribution of mmf under main poles of a d.c machine.

6. Why the armature core in d.c machines is constructed with laminated steel sheets instead of solid steel sheets? (A/M-2018)

The main poles in DC machines are constructed with laminated steel sheets instead of solid steel in order to reduce the eddy current loss.

7. What is the importance of residual Emf in a self excited DC generator? (A/M-2018)

The residual emf in a self excited dc generator is used to develop emf in an armature.

8. Write EMF equation of DC generator. (N/D 2016)

$$Eg = \frac{\varphi Z N P}{60 A} \text{ volts.}$$

where

Eg - Induced emf in generator

P - Number of poles

Z - Total number of conductors in armature.

N - Speed in rpm

A - Number of parallel path

φ - Flux per pole in wb.

For Lap winding $A = P$

For wave winding $A = 2$.

9. What is the purpose of commutator in a dc generator? (A/M - 2009)

The commutator converts the alternating emf into unidirectional or direct emf.

10. Define the term critical field resistance of DC shunt generator.

A tangential line is drawn to the linear portion of open circuit characteristics from origin. the slope of this tangent is called critical field resistance.

UNIT – III

TWO Marks.

1. How does a d.c motor differ from d.c generator in construction ? (A/M - 2019)

→ structurally, a motor and generator is same machine. There is no structural difference. The difference lies in the i/p given

→ If we give supply of electricity through brush commutator and excited coil, the machine will behave like motor.

→ Generator o/p - voltage, current
motor e/p - speed, torque.

2. What is the function of no-voltage release coil provided in a dc motor starter? (A/M - 2019)

No volt release coil is basically a relay system which automatically trips off the motor if supply is cut-off or decreased beyond a limit.

3. Why series motor should be started with loaded conditions ? (N/D - 2018)

→ In series motor, flux is directly proportional to armature current, i.e $\phi \propto I_a$.
→ Under no load condition, the armature current is very low and flux also will be less. The motor speed will be very high. Due to this motor will be damaged.
→ Hence DC series motor should always be started with some load on the shaft.

4. What is the need of starter for DC motor? (M/J - 2018)

→ When a DC motor is directly switched ON, at the time of starting, the motor back emf is zero. Due to this armature current is very high, the motor gets damaged.
→ To reduce the starting current of the motor a starter is used.

5. How will you change the direction of rotation of d.c motor? (A/M - 2018)

To reverse the motor, you need to change the polarity of the supply voltage to either the field winding or the armature winding, but not both.

6. Why commutator is employed in d.c machines?

→ In dc generator, the emf induced in the armature coil is alternating in nature, Commutator reverses the current.

→ In motor, this is necessary to maintain a unidirectional torque.

7. What are the applications of DC motor?

DC shunt motor: It is a constant speed motor. Ex: Lathe, Drills, Boring mills shapers, spinning & weaving machines

DC series motor: It is a variable speed motor.
Ex: Electric traction, cranes, Elevators Air compressor, Vacuum cleaner

DC compound motor: variable speed motors.
Ex→ pressure sheers Reciprocating machine.

8. List various method of starting D.C motor. N/D-2016

1. Two point starter
2. Three point starter
3. Four point starter.

9. What is meant by dynamic braking on D.C motor? N/D-2016

It is termed as rheostatic if the generated electrical power is dissipated as heat in brake grid resistors and regenerative if the power is returned to the supply line.

UNIT – IV

1. Mention the difference between core and shell type transformers.

In the core type the windings surround the core considerably and in shell type the core surround the winding.

2. Does the transformer draw any current when secondary is open ? why ?

Yes. it (primary) will draw the current from the main supply in order to magnetise the core and to supply iron and copper losses on no load. There will not be any current in the secondary sine secondary is open.

3. Define all day efficiency of transformer.

The ratio of o/p in kwh to i/p in kwh of a transformer over a 24 hour period is known as all-day efficiency.

$$\eta_{all\text{-}day} = \frac{\text{kwh o/p in 24 hours}}{\text{kwh i/p in 24 hours}}$$

4. Why transformers are rated in KVA?

Copper loss of transformer depends on current and iron loss on voltage. Hence total losses depend on Volt. Ampere and not on the power factor. This why the rating of transformers are in KVA and not in KW.

5. When will a Bucholz relay operate in a transformer?

Bucholz relay is a protective device in a transformer. If the temperature of the coil exceeds its limit, Bucholz relay operates and gives an alarm.

6. How does change in frequency affect the operation of a given transformer.

With a change in frequency, iron loss, copper loss, regulation, efficiency and heating varies and thereby the operation of the transformer is affected.

7. What are the functions of no-load current in a transformer?

No-load current produces flux and supplies iron loss and copper loss on no load.

8. What is the purpose of providing taps in transformer and where these are provided?

In order to attain the required voltage taps are provided normally it will be provided at low voltage sides.

9. Give the method of reducing iron loss in a transformer.

The iron losses are minimized by using high grade core material like silicon steel having very low hysteresis loop and by manufacturing the core in the form of laminations.

10. State the conditions for maximum efficiency ?

Iron loss = Copper loss (or)

Constant loss = variable loss.

If we are giving iron loss and full load copper loss, then the load corresponding to the maximum efficiency is given by

$$= \text{Full load kVA} \times \sqrt{\frac{\text{Iron loss}}{\text{Full load Cu loss.}}}$$

UNIT- V

1. What are the advantages of auto transformer over two- winding transformer?
   1. Higher efficiency
   2. Small size
   3. Smaller exciting current
   4. Lower cost
   5. Better voltage regulation
   6. Continuously varying voltage can be obtained.
   7. Require Less copper.

2. Under what value of power factor of a transformer gives zero voltage regulation?

   Leading power factor.

3. What are the various types of 3-φ transformer connections?
   * star- star connection
   * star- delta connection
   * Delta- Delta connection
   * Delta- star connection.

4. State the advantages of open delta connection.

* If delta-delta bank of transformers is inoperative, it is possible to continue service with reduced capacity.
* It is preferable, if the three phase load is small.
* It will increase the rating, if the load increases.

5. Mention the uses of auto transformers.

i) Auto transformers are used for starting induction motors and synchronous motors.
ii) Used in electrical testing laboratories.
iii) Used as boosters in Ac feeder.
iv) Used in furnace transformers.

6. Write down equations for volt-ampere transferred inductively and volt-ampere transferred conductively in an autotransformer.

Power transferred inductively = I/p power(1-k)

Power transferred conductively = I/p power x k

where k = Transformation ratio.

7. What is an ideal transformer ?

A transformer is called ideal transformer if its efficiency is 100%.

8. Why is the range of efficiency in transformer higher than those of other electrical machines ?

The range of efficiency in transformer is higher than those of other electrical machines because there are no rotating parts, ie rotational loss is zero.

9. Why is the core of transformer laminated ?

The core of transformer is laminated in order to minimize eddy current loss.

10. How can the iron loss be minimised in a transformer ?

The iron loss in a transformer is made up of hysteresis and eddy current loss.

Hysteresis loss minimized by using steel of high silicon.

Eddy current loss can be minimized by using very thin laminations of transformer core.