CHAPTER-3. TRANSFORMERS

[1] A Buchholz relay can be installed on
- **A.** Auto-transformers
- **B.** Air-cooled transformers
- **C.** Welding transformers
- **D. Oil cooled transformers**

[2] The chemical used in breather is
- **A.** Asbestos fibre
- **B.** Silica sand
- **C.** Sodium chloride
- **D. Silica gel**

[3] Material used for construction of transformer core is usually
- **A.** 0.4mm to 0.5 mm
- **B.** 4mm to 5 mm
- **C.** 14mm to 15 mm
- **D. 25mm to 40 mm**

[4] Helical coils can be used on
- **A. Low voltage side of high kVA transformers**
- **B.** High frequency transformers
- **C.** High voltage side of small capacity transformers
- **D.** High voltage side of high kVA rating transformers

[5] The transformer ratings are usually expressed in terms of
- **A.** Volts
- **B.** Amperes
- **C.** kW
- **D. kVA**

[6] The value of flux involved in the emf equation of a transformer is
- **A.** rms value
- **B.** rms value
- **C. Maximum value**
- **D.** Instantaneous value

[7] The main advantage of auto transformer over a two winding transformer is
- **A.** Hysteresis losses are reduced
- **B. Saving in winding material**
- **C.** Copper losses are negligible
- **D.** Eddy losses are totally eliminated

[8] During short circuit test iron losses are negligible because
- **A.** The current on secondary side is negligible
- **B.** The voltage on secondary side does not vary
- **C. The voltage applied on primary side is low**
- **D.** Full-load current is not supplied to the transformer

[9] Which of the following properties is not necessarily desirable in the material for transformer core?
- **A.** Mechanical strength
- **B.** Low hysteresis loss
- **C. High thermal conductivity**
- **D.** High permeability

[10] The main reason for generation of harmonics in a transformer could be
- **A.** Fluctuating load
- **B.** Poor insulation
- **C.** Mechanical vibrations
- **D. Saturation of core**

[11] A transformer transforms
- **A.** frequency
- **B.** voltage

C. current
D. voltage and current

[12] Which is not the basic element of the transformer?
A. core
B. primary winding
C. secondary winding
D. mutual flux

[13] In an ideal transformer
A. windings have no resistance
B. core has no losses
C. core has infinite permeability
D. all of the above

[14] The frequency of the secondary voltage of a transformer will be.....
A. less than frequency of the primary voltage
B. equal to the primary voltage
C. greater than the frequency of the primary voltage
D. much greater than the frequency of the primary voltage

[15] The efficiency of a transformer is maximum when
A. It runs at half full load
B. it runs at full load
C. its Cu loss equal iron loss
D. it runs over load

[16] A step-up transformer increases
A. voltage
B. current
C. power
D. frequency

[17] Which type of loss is not common to transformer and rotating machines?
A. Eddy current loss
B. Copper loss
C. Hysteresis loss
D. Windage loss

[18] The transformer core is laminated to
A. Reduce the copper losses
B. Reduce the core losses
C. Reduce the eddy current losses
D. None of the above

[19] Transformer cores are built up from laminations rather than from solid metal so that
A. Oil penetrates the core more easily
B. Eddy current loss is reduced
C. Less lamination is required for the windings
D. Turn ratio is higher than voltage ratio

[20] the main purpose of using core in a transformer is to
A. Decrease iron losses
B. prevent eddy current loss
C. eliminate magnetic hysteresis
D. decrease reluctance of the common magnetic circuit

[21] The ordinary two winding transformer's primary and secondary windings always have
A. different no of turns
B. same size of copper wire
C. a common magnetic circuit
D. separate magnetic circuits

[22] No load test on a transformer is carried out to find
A. copper loss
B. magnetising current

C. **magnetising current and no load loss**

D. efficiency of the transformer

[23] Transformers are rated in KVA instead of KW because

A. load power factor is often not known

B. KVA is fixed whereas KW depends on load power factor

C. **Total transformer loss depends on volt ampere**

D. It has become customary

[24] Transformer cores are laminated in order to

A. simplify its construction

B. **minimise eddy current loss**

C. reduce cost

D. reduce hysteresis loss

[25] A step up transformer increases

A. **voltage**

B. current

C. power

D. frequency

[26] In a two winding transformer, the primary and secondary induced emf E1 & E2 are always

A. equal in magnitude

B. anti phase with each other

C. **in phase with each other**

D. determined by load on transformer secondary

[27] In a transformer, the leakage flux of each winding is proportional to the current in that winding because

A. Ohm's law applies to magnetic circuits

B. **Leakage paths do no saturate**

C. the two windings are electrically isolated

D. mutual flux is confined to the core

[28] In a two winding transformer, the emf /turn in secondary winding is always......the induced emf power turn in primary

A. equal to k times

B. equal to 1/k times

C. **equal**

D. greater than

[29] In transformer terminology, the ratio 20:1 indicates that

A. there are 20 turns on primary one turn on secondary

B. **secondary voltage is 1/20th of the primary**

C. primary current is 20 times greater than the secondary current

D. for every 20 turns on primary, there is one turn on secondary

[30] In performing the short circuit test of a transformer

A. high voltage is usually short circuited

B. **low voltage side is usually short circuited**

C. any side is short circuited with preference

D. none of the above

Common Data for Questions 1 and 2: [GATE 2009]
The star-delta transformer shown above is excited on the star side with a balanced,4-wire,3-phase,sinusoidal voltage supply of rated magnitude. The transformer is under no load condition.
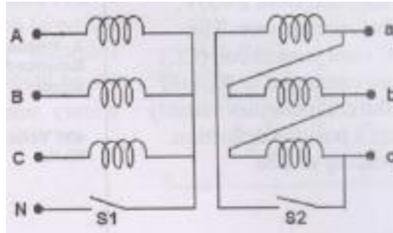
**[31]** With both S1 and S2 open, the core flux waveform will be **[GATE 2009]**
      A. a sinusoidal at fundamental frequency
      B. flat-topped with third harmonic
      C. peaky with third-harmonic
      D. none of these

[32] With S2 closed and S1 open, the current waveform in the delta winding will be **[GATE 2009]**
      A. a sinusoidal at fundamental frequency
      B. flat-topped with third harmonic
      C. only third-harmonic
      D. none of these

Common Data for Questions 3 **and** 4:
The circuit diagram shows a two-winding, losses transformer with no leakage flux, excited from a current source,i(t),whose waveform is also shown. The transformer has a magnetizing inductance of $400/\pi$mH.
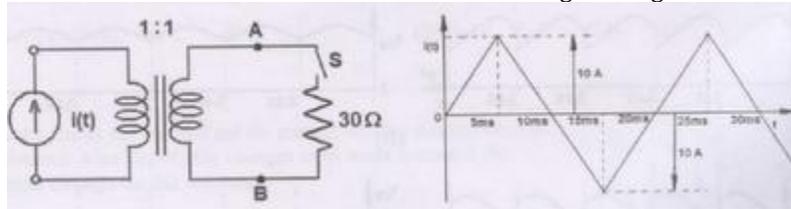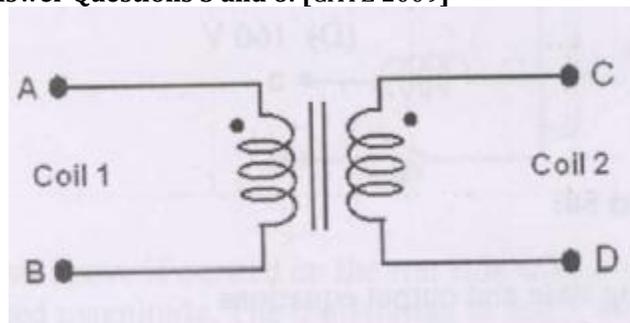

[33] The peak voltage across A and B, with S open is **[GATE 2009]**
      A. $400/\pi$V
      B. 800πV
      C. $4000/\pi$ V
      D. $800/\pi$V

[34] If the waveform of i(t) is changed to i(t)= $10 \sin(100\pi t)$A, the peak voltage across A and B with S closed is **[GATE 2009]**
      A. 400V
      B. 240V
      C. 320V
      D. 160V

Statement for Linked Answer Questions 5 and 6: [GATE 2009]

The figure above shows coils 1 and 2, with dot markings as shown, having 4000 and 6000 turns respectively. Both the coils have a rated current of 25**A.** Coil 1 is excited with single phase, 400V, 50Hz supply.

[35] The coils are to be connected to obtain a single phase, 400/1000V, auto-transformer to drive a load of 10kV**A.** Which of the options given should be exercised to realize the required auto-transformer? **[GATE 2009]**
   **A. Connect A and D; Common B**
      B. Connect B and D; Common C

C. Connect A and C; Common B

D. Connect A and C; Common D

[36] In the autotransformer obtained in Question 57, the current in each coil is **[GATE 2009]**

    A. Coil-1 is 25A and Coil-2 is 10A

    B. Coil-1 is 10A and Coil-2 is 25A

    C. Coil-1 is 10A and Coil-2 is 15A

    D. Coil-1 is 15A and Coil-2 is 10A

[37]The single phase, 50Hz iron core transformer in the circuit has both the vertical arms of cross sectional area 20cm^2 and both the horizontal arms of cross sectional area 10cm^2. If the two windings shown were wound instead on opposite horizontal arms, the mutual inductance will **[GATE 2009]**
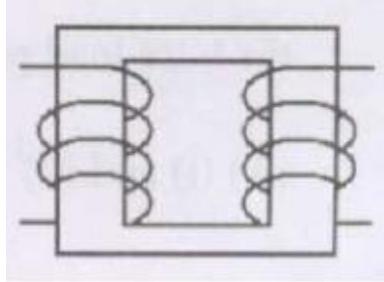
    A.Double

    B.Remain same

    C.Be halved

    D.Become one quarter

Ans:-

[38] In a transformer the energy is conveyed from primary to secondary?

    A. Through cooling coil

    B. Through air

    C. By the flux

    D. None of the above

[39] Which loss is not common between a transformer and rotating machines?

    A. Eddy current loss

    B. Copper loss

    C. Windage loss

    D. Hysteresis loss

[40] No load test on a transformer is carried out to find

    A. Copper loss

    B. magnetising current

    C. Magnetising current and loss

    D. Efficiency of the transformer

[41] Sumpner's test is conducted on transformers to find

    A. Temperature

    B. Stray losses

    C. All-day efficiency

    D. None of the above

[42] The efficiency of a transformer will be maximum when

    A. copper losses = hysteresis losses

    B. Hysteresis losses = eddy current losses

    C. Eddy current losses = copper losses

    D. Copper losses = iron losses

[43] The purpose of providing an iron core in a transformer is to

    A. Provide support to windings

B. Reduce hysteresis loss

C. decrease the reluctance of the magnetic path

D. reduce eddy current losses

[44] The highest voltage for transmitting electrical power in India is

A. 33kV

B. 66kV

C. 132kV

D. 400kV

[45] The function of conservator in a transformer is

A. To protect against internal fault

B. To reduce copper as well as core losses

C. To cool the transformer oil

D. To take care of the expansion and contraction of transformer oil due to variation of temperature of surroundings

[46] The core used in high frequency transformer is usually

A. Copper core

B. Cost iron core

C. Air core

D. Mid steel core

[47] Cross over windings are used in

A. Low voltage side of high kVA rating transformers

B. Current transformers

C. High voltage side of high kVA rating transformers

D. High voltage side of low kVA rating transformers

[48] During light loads, the transformer efficiency is low because

A. Secondary output is low

B. Transformer losses are high

C. Fixed loss is high in proportion to the output

D. Cu loss is small

[49] The open circuit test is carried out in a transformer to find the

A. Cu loss

B. Core loss

C. Total loss

D. Insulation resistance

[50] The equivalent resistance of the primary of the transformer having K = 5, R1 = 0.1 ohm when referred to secondary becomes .....ohm

A. 0.5

B. 0.02

C. 0.004

D. 2.5

[51] A transformer has negative voltage regulation when its load power factor is

A. Zero

B. Unity

C. Leading

D. Lagging

[52] A transformer has 1000 primary turns, connected to 250V ac supply. To get 400V secondary voltage the no of secondary turns should be

A. 1600

B. 250

C. 400

D. 1250

[53] The iron loss of the transformer is negligible during short circuit test because
  A. The entire input is just sufficient to meet Cu losses only
  B. Flux produced is a small fraction of the normal flux
  C. Iron core becomes fully saturated
  D. Supply frequency is held constant

[54] In operating a 400hz transformer at 50Hz
  A. Only voltage is reduced in the same proportion as the frequency
  B. Only KVA rating is reduced in the same proportion as the frequency
  C. Both voltage and KVA rating are reduced in the same proportion as frequency
  D. None of the above

[55] When a 400Hz transformer is operated at 50Hz its KVA rating is
  A. Reduced to 1/8
  B. Increased 8 times
  C. Unaffected
  D. Increased 64 times

[56] Which of the following does not change in a transformer?
  A. Current
  B. Voltage
  C. Frequency
  D. All of the above

[57] In a transformer the resistance between its primary and secondary is
  A. Zero
  B. 1Ω
  C. 1000 Ω
  D. Infinite

[58] If a pump motor is run on 2/3rd of its supply voltage, it will
  A. Continue to deliver same power
  B. burn
  C. stall
  D. continue to run at lower speed

[59] An ideal transformer has infinite values of primary and secondary inductances. The statement is
  A. True
  B. False

[60] The noise resulting from vibrations of laminations set by magnetic force, is termed as
  A. magnetostriction
  B. boo
  C. hum
  D. zoom

[61] The degree of mechanical vibrations produced by the laminations of a transformers depends on
  A. Tightness of clamping
  B. Gauge of laminations
  C. Size of laminations
  D. All of the above

[62] The no-load current drawn by transformer is usually........percent of the full-load current?
  A. 0.2 to 0.5 %
  B. 2 **to 5%**
  C. 12 to 15 %
  D. 20 to 30 %

[63] The dielectric strength of transformer oil is expected to be
  A. 1kV
  B. 33kV
  C. 100kV
  D. 330 kV

[64] During the short-circuit test on a small transformer the frequency is increased from 50-200Hz. The copper losses will increase by a factor of

A. **16**
B. 4
C. 1
D. 1/4

[65] No-load current in a transformer
A. **Lags behind the voltage by about 75 deg**
B. leads the voltage by about 75
C. lags behind the voltage by about 15
D. leads the voltage by about 15

[66] While conducting short-circuit test on a transformer the following side is short circuited
A. High voltage side
B. **low voltage side**
C. primary side
D. secondary side

[67] The chemical used in breather for transformer should have the quality of
A. Ionizing air
B. **Absorbing moisture**
C. Cleansing the transformer oil
D. Cooling the transformer oil

[68] The path of a magnetic flux in a transformer should have
A. High resistance
B. High reluctance
C. Low resistance
D. **Low reluctance**

[69] In case there are burrs on the edges of the laminations of the transformer, it is likely to result in
A. Vibrations
B. Noise
C. **Higher eddy currents loss**
D. Higher hysteresis loss

[70] Silicon steel used in laminations mainly reduces
A. **Hysteresis loss**
B. Eddy current losses
C. Copper loss
D. All of the above

[71] High frequency transformers sometimes make use of ferrite cores because it has
A. High specific gravity
B. **High resistance**
C. High hysteresis
D. low permeability

[72] Harmonics in transformer result in
A. Increased core losses
B. Increased I2R losses
C. Magnetic interference with communication circuits
D. **All of the above**

[73] The full load copper loss of a transformer is 1600W. At half-load the copper loss will be
A. 6400W
B. 1600W
C. 800W
D. **400W**

[74] Power transformers are generally designed to have maximum efficiency around
A. No load
B. Half load
C. **Near full load**
D. 10% overload

[75] Two transformers are connected in parallel. These transformers do not have equal percentage impedance which results

    A. Short-circuiting of the secondaries

    B. Power factor of one of the transformers is leading while that of the other lagging

    C. Transformers having higher copper losses will have negligible core losses

    D. Loading of the transformers not in proportion to their kVA ratings.

[76] The changes in volume of transformer cooling oil due to variation of atmospeheric temperature during day and night is taken care of by which part of transformer?

    A. Conservator

    B. Breather

    C. Bushings

    D. Buchholz relay

[77] The transformer laminations are insulated from each other by

    A. Mica strip

    B. Thin coat of varnish

    C. Paper

    D. Any of the above

[78] Which type of winding is used in 3 phase shell type transformer?

    A. Circular type

    B. Sandwich type

    C. Cylindrical type

    D. Rectangular type

[79] During open circuit test of a transformer

    A. Primary is supplied rated voltage

    B. Primary is supplied full load current

    C. Primary is supplied current at reduced voltage

    D. Primary is supplied rated kVA

[80] Which of the following is not standard voltage for power supply in India

    A. 11kV

    B. 33kV

    C. 66 kV

    D. 122 **kV**

[81] A transformer core is laminated to

    A. Reduce hysteresis loss

    B. Reduce eddy current losses

    C. Reduce copper losses

    D. Reduce all above losses

[82] While conducting short-circuit test on a transformer the following side is short-circuited

    A. High voltage side

    B. Low voltage side

    C. Primary side

    D. Secondary side

[83] Distribution transformers are generally designed for maximum efficiency around

    A. 90% load

    B. Zero load

    C. 25% load

    D. 50% load

[84] A transformer oil must be free from

    A. Sludge

    B. Odour

    C. Gases

    D. Moisture

[85] The use of higher flux density in the transformer design
        A. Reduces weight per KVA
        B. Reduces iron losses
        C. Reduces copper losses
        D. Increases part load efficiency

[86] In a transformer the toppings are generally provided on
        A. Primary side
        B. Secondary side
        C. Low voltage side
        D. High voltage side

[87] Which of the following is not a part of transformer installation?
        A. Conservator
        B. Breather
        C. Buchholz relay
        D. Exciter