1- Which of the following statement is true for no-load current of the transformer?

a. has high magnitude and low power factor.
b. has high magnitude and high power factor.
c. has small magnitude and high power factor.
d. has small magnitude and low power factor.

2- Which of the following is the main advantage of an auto-transformer over a two-winding transformer?

a. Eddy losses are totally eliminated.
b. Copper losses are negligible.
c. Saving in winding material.
d. Hysteresis losses are reduced.

3- 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 p.f.
c. Total transformer loss depends on volt-ampere.
d. It has become customary.

4- Copper losses occurs due to ohmic resistance in

a. Primary winding.
b. Secondary winding.
c. Both primary and secondary Winding.

d. None of these.

5- Which of the following equation correctly represents the exact equivalent circuit of transformer?

a. $V_1=E_1+I_1R_1+jI_1X_1$.

b. $V_1=E_1+I_1R_1+jI_2X_2$.

c. $V_2=E_2+I_1R_1+jI_1X_1$.

d. $V_1=E_1-I_1R_1+jI_1X_1$.

6- If R_1 is the primary winding resistance and R_2 is the secondary winding resistance then the equivalent resistance of the transformer as referred to the secondary is

a. $R_1+ R_2/K^2$.

b. $R_2+ R_1/K^2$.

c. $R_1+ K^2R_2$.

d. $R_2+ K^2R_1$.

7- For a transformer, no load primary current has two components, magnetizing component and active components. The magnetizing component is given by

a. $I_0 \cos \Phi_0$.

b. $I_0 \cot \Phi_0$.

c. $I_0 \sin \Phi_0$.

d. $I_0 \tan \Phi_0$.

8- The transformer ratings are usually expressed in

a. Volts.

b. Amperes.

c. kW.

d. kVA.

9- For a certain transformer if E1 is the emf across primary winding, E2 is the emf across secondary winding and K is the ratio of secondary to primary turns. The value of secondary emf referred to the primary side is

a. E_2 / K.

b. E_2 / K^2.

c. $K E_2$.

d. $K^2 E_2$.

10- If R is the resistance of secondary winding of an electrical transformer and K is the transformation ratio then the equivalent secondary resistance referred to primary will be _____

a. R/VK.

b. R/K^2.

c. R^2/K^2.

d. R^2/K.

11- Compared to the two winding transformer, in an autotransformer the leakage reactance and copper losses is

a. less, more.
b. less, less.
c. more, more.
d. more, less.

12- Auto-Transformer has _____ windings.

a. 2.
b. 3.
c. 1.
d. 4.

13- The auto-transformer efficiency is _____.

a. High.
b. Low.
c. very high.
d. Infinite.

14- A 25 KVA transformer is constructed to a turns ratio of $N_1/N_2 = 10$. The impedance of primary winding is 3+j5 ohms and of secondary winding is 0.5+j0.8 ohms. What will be the impedance of transformer when referred to primary?

a. 53j + 85 ohms.

b. 53 + 85j ohms.

c. 3.5 + 5.8j ohms.

d. Can't be calculated.

Ans 1-d, 2-c, 3-c, 4-c, 5-a, 6-d, 7-c, 8-d, 9-a, 10-b, 11-b, 12-c, 13-a, 14-b

Problems

1- A transformer takes a magnetizing current of 6 A and a core loss current of 1.25 A. Determine the transformer's:

a. No-load current.

b. No-load power factor.

Ans:- (I_0 = 6.13 A, power factor = 0.2 (lagging))

2- An 11 kV/400 V single-phase transformer is supplying a load current of 40 A at a power factor of 0.8 lag. The transformer has iron losses of 400 W and at this load, the copper loss is 700 W. Determine the efficiency of the transformer.

Ans:- (92%)

3- A single phase, 50 kVA, 2300/230 V, 50 Hz transformer is connected to 230 V supply on the secondary side, the primary being open. The meter indicate the following readings: Power = 230 watt , Voltage = 230 V Current = 6· 5 A , Find:

a. Core loss

b. loss component of the current

c. magnetizing current.

Ans:- (Core loss = 230 W, I_w= 1.0 A, I_m= 6.423 A)

4- A 230V, 50 Hz transformer has 200 primary turns. It draws 5 A at 0.25 p.f lagging at no-load. Determine:

a. Maximum value of flux in the core.

b. Core loss.

c. Magnetizing current.

d. Exciting resistance and reactance of the transformer. Also draw its equivalent circuit.

Ans:- (ϕ_m = 5.18 m Wb, Core loss= 287.5 W, I_m= 4.84A, R_0= 184 Ω, X_0= 47.52 Ω)

5- A 63 kVA, 1100/220 V single-phase transformer has R_1 = 0.16 ohm, X_1 = 0.5 ohm, R_2=0.0064 ohm and X_2 = 0.02 ohm. Find equivalent resistance and reactance as referred to secondary winding.

Ans:- (R_{02}= 0.0128 Ω, X_{02}= 0.04 Ω)

6- A 33 kVA, 2200/220V, 50Hz single phase transformer has the following parameters. Primary winding resistance R_1 = 2.4 Ω, Leakage reactance X_1 = 6 Ω Secondary winding resistance R_2 = 0.03 Ω Leakage reactance X_2 = 0.07 Ω. Then find Primary, Secondary and equivalent resistance and reactance.

Ans:- (R_{01}= 5.4 Ω, X_{01}= 13 Ω, R_{02}= 0.054 Ω, X_{02}= 0.13 Ω)

7- The primary winding resistance and reactance of a 10 kVA, 2000/400 V, single phase transformer is 5.5 ohm and 12 ohm, respectively, the corresponding values for secondary are 0.2 ohm and 0.45 ohm. Determine the value of the secondary voltage at full load, 0.8 p.f. lagging, when the primary supply voltage is 2000 V.

Ans:- (V_2= 377.65 V)

8- A 10 kVA, 500/100 V transformer has the following circuit parameters referred to primary: Equivalent resistance, R_{01} = 0.3 ohm; Equivalent reactance, X_{01} = 5.2 ohm. When supplying power to a lagging load, the current, power and voltage measured on primary side were 20 A, 8 kW and 500 V, respectively. Calculate the voltage on the secondary terminals under these conditions

Ans:- (V_2= 86·56 V)

9- A 50 kVA transformer on full load has a copper loss of 600 watt and iron loss of 500 watt, calculate the maximum efficiency and the load at which it occurs.

Ans:- (η = 97·85%)

10- A 400/100 V, 5 kVA, two-winding transformer is to be used as an autotransformer to supply power at 400 V from 500 V source. Draw the connection diagram and determine the kVA output of the autotransformer

Ans:- (KVA output = 25 KVA)

11- The primary and secondary voltages of an auto-transformer are 250 V and 200 V, respectively. Show with the aid of a diagram the current distribution in the windings when the secondary current is 100 A and calculate the economy of copper in this particular case (in percentage).

Ans:- (Economy in Cu = 80%)