Ministry of Higher Education and Scientific Research

Al-Mustaqbal University

College of Engineering & Technology

Medical Instrumentation Techniques Engineering Department

Electrical Technology

Third Class

Weeks 3 & 4

Testing in Transformers

Tutorial

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1- During open circuit test (OC) of a transformer _____

    a. primary is supplied rated kVA.

    b. primary is supplied full-load current.

    c. primary is supplied current at reduced voltage.

    d. primary is supplied rated voltage.

2- Open circuit test on transformers is conducted so as to get _____

    a. Hysteresis losses.

    b. Copper losses.

    c. Core losses.

    d. Eddy current losses.

3- Why OC test is performed on LV side?

    a. Simple construction.

    b. Less voltage is required and parameters can be transformed to HV side.

    c. It'll not give losses conducted on HV side.

    d. HV side does not have connections for voltage.

4- While conducting short-circuit test on a transformer which side is preferred to be short circuited?

    a. High voltage side.

    b. Low voltage side.

    c. Primary side.

    d. Secondary side.

5- During short circuit test why iron losses are negligible?

    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.

6- Short circuit test on transformers is conducted to determine _____

a. Core losses.

b. Copper losses.

c. Hysteresis losses.

d. Eddy current losses.

7- Why SC test is not conducted on LV side?

a. Difficult to arrange low voltage supply.

b. Difficult to arrange high current supply.

c. Difficult to arrange low voltage and high current supply to the LV.

d. SC test on LV does not give correct results.

8- For a transformer given of 100 kVA, 220/6000-V transformer, short circuit test is performed. What current rating is needed ?

a. 30A.

b. 445A.

c. 60A.

d. Can't be calculated.

9- Which of the below estimations require results of both open circuit test and short circuit test?

a. Efficiency.

b. Equivalent impedance of one side of the winding.

c. Voltage regulation for exact circuit.

d. All of the mentioned.

10- If the transformer is step-up transformer then for performing short circuit test , the measuring devices are connected to the:

    a. H.V. side.

    b. L.V. side.

    c. Any side.

    d. Test cannot be performed on step up t / f.

11- _____ is performed using only voltmeter.

    a. Open circuit test.

    b. Short circuit test.

    c. Back-to-back test.

    d. Polarity test.

12- If the reading of the meter in polarity test is $E_1 + E_2$ then:

    a. Polarity marking of one of the windings must be reversed.

    b. The transformer is short circuited.

    c. The measuring device is damaged.

    d. All of the above.

13- The reading of the wattmeter in O.C. test represents:

    a. The rating of transformer.

    b. The hysteresis loss.

    c. The core and iron losses

    d. The power dissipated by the windings.

14- If O.C. test is conducted at the primary side, then the Ammeter is used to calculate:

    a. I_μ.

    b. I_0.

c. I_W'.

d. I_{1sc}.

15- The auto-transformer is used in S.C test to:

a. Calculate the leakage current.

b. to generate a high voltage at the input of the transformer.

c. To apply a low voltage at the input side with rated current at the short circuit side.

d. All of the above.

16- We can use O.C test and S.C. test to obtain:

a. R_0, X_0, Z_{01}.

b. Only R_1, X_1.

c. Only Z_{01}.

d. None of the above.

17- The efficiency of two identical transformers under load conditions can be determined by ?

a. Short-circuit test.

b. Back-to-back test.

c. Open circuit test.

d. Polarity test

18- While performing a short-circuit test on a transformer, usually low-voltage side is short-circuited because it has ?

a. low insulation.

b. easy access.

c. lower terminal voltage and higher current rating.

d. more number of turns.

Problems

1- **The following data were obtained on a 20 kVA, 50 Hz, 2000/200 volt distribution transformer**

	V (Volt)	I (Amp)	Power (Watt)	Side
O.C. Test	200	4	120	L.V.
S.C. Test	60	10	300	H.V

Draw approximate equivalent circuit referred to H.V. side and L.V. side.

Ans:- ($R_0 = 33333$ Ω, $X_0 = 5057$ Ω, $R_{01} = 3$ Ω, $X_{01} = 5.2$ Ω, ($R'_0 = 333.33$ Ω, $X'_0 = 50.57$ Ω, $R_{02} = 0.03$ Ω, $X_{02} = 0.052$ Ω))

2- **A 10 kVA, 2500/250 V, single phase transformer gave the following results:**

	V (Volt)	I (Amp)	Power (Watt)	Side
O.C. Test	250	0.8	50	L.V.
S.C. Test	60	3	45	H.V.

Find the equivalent circuit parameters referred to LV side?

Ans:- ($R'_0 = 1250$ Ω, $X'_0 = 323$ Ω, $R_{02} = 0.05$ Ω, $X_{02} = 0.1936$ Ω)

3- **A 5 kVA 200/1000 V, 50 Hz, single-phase transformer gave the following test results:**

   O.C. Test (L.V. Side) : 200 V, 1.2 A, 90 W

   S.C. Test (H.V. Side) : 50 V, 5A, 110 W

   Calculate the parameters of the equivalent circuit referred to the L.V. side.

Ans:- ($R_0 = 444$ Ω, $X_0 = 180.2$ Ω, $R_{01} = 0.176$ Ω, $X_{01} = 0.36$ Ω)

4- **Obtain the equivalent circuit of a 200/400-V, 50-Hz, 1-phase transformer from the following test data :**

   O.C test : 200 V, 0.7 A, 70 W – on L.V. side

S.C. test : 15 V, 10 A, 85 W – on H.V. side

Ans:- (R_0 = 571.4 Ω, X_0 = 330 Ω, R_{01} = 0.21 Ω, X_{01} = 0.31 Ω)