Transformers

 Tutorial sheet

Q1) The primary winding of a single phase Transformer is connected to

 230 Volt, 50 HZ supply .The secondary winding has 1500 turns .If the

 Maximum value of the core Flux is 0.00207 WB, determine:

 i)The number of turns on the primary winding.

 ii)The secondary induced Voltage.

 Answers: i) 500 ii) Vs= 689.31 Volt.

Q2) A 5 KVA, (250/500) Volt, 50 HZ, single phase Transformer gave the

 The following NO load test:

 250 V, 0.75 A, 60 Watt, on low Voltage side, calculate:

 The equivalent circuit constants (Ro &Xo).

 Answers: Ro= 1041.67 ohm. ; Xo= 351.864 ohm.

Q3) A 40 KVA, (400/200) V, 50 HZ, 1- phase Transformer gave Following results:

 Open circuit Test: 400 V; 5A; 500 Watt.

 Short circuit Test: 10 V ; 50A ; 150 Watt.

 i)Draw the Transformer equivalent circuit and show the Values of resistances

 and reactance’s in terms of the primary side.

 ii) Calculate the terminal Voltage, when the Transformer delivers the

 Soled output at P.F of 0.8 lagging on the low Voltage side.

 Answers: Ro= 320 ohm; Xo =82.623 ohm; Req= 0.06 ohm

 Xeq = 0.190 ohm ; Terminal Voltage =193.88 V .

Q4) A single phase Transformer has (Np/Ns) = 6.The resistances are 0.9 Ω

 And 0.03 Ω, and the reactance’s 5 Ω and 0.13 Ω for high Voltage and Low

 Voltage Winding respectively. Determine:

a)The Voltage be applied to high Voltage side to obtain full load current of

 200 A in the Low Voltage winding on short circuit. b)The Power Factor.

 Answers: The Voltage =329.3 V ; P.F =0.2

Q5) A Transformer operating at no- load draws an exciting current Io= 5 A,

When the primary to a 120 volt, 60 HZ source. The wattmeter reads 180 Watt it is known as the iron losses in the core. Calculate:

1. The reactive Power. b) The values of Ro &Xo. c) The values of Ic & Im

 Answers: a)Q=572.36 VAR ; b) Ro= 80 Ω ; Xo= 25.59Ω ; c)Ic= 1.5 A ; Im =4.7696 A

 

 Primary Voltage (Vp)= Vo=Ep = 120 V ;Po=180 Watt

Q6) The open circuit ratio of 4.6 KVA, 1- phase Transformer is given as (230/460)V. It has a primary resistance of 0.2 Ω and a reactance of 0.5 Ω, and corresponding values for secondary are R2 =0.75 Ω and X2 = 1.8 Ω respectively. Compute:

a) The terminal voltage on the secondary side on full load .

b)The Voltage regulation for 0.8 P.F lagging . Answers: a) 424.8 V b)Reg =8.29 %.

Q7) A 1- phase Transformer has (N1/N2) = 6. The Resistances are 0.9 Ω & 0.03 Ω and

 The reactance’s 5 Ω & 0.13 Ω for High Voltage and Low Voltage Winding respectively . Determine:

 a) The Voltage applied to H.V side to obtain full load current of 200 A in the Low Voltage winding on short circuit.

 b) The Power factor on short circuit.

 Answers: a) 329.3 V ; b) 0.202

Q8) A 1- phase step- up Transformer having turns ratio (N) =4 , takes 1A at 0.15 power factor lagging on NO – load . Determine the primary and Power factor when the Transformer is supplying a load of 25A at 0.8 Power factor. Neglect Voltage drop in the Transformer.

 Answers: Ip = 7A ; Power factor (P.F) =0.736.

Q9) Deduce the efficiency at full load and 0.8 Power factor (P.F) of 40 KVA (3200/400) Transformer.

Given: R1 = 0.2 Ω , R2 =0.0025 Ω and iron losses = 2500 Watt, neglect magnetizing current .

 Answer: efficiency ( Ƞ ) = 92. 01 % .

Q10) A 10 KVA, (220/ 2200) Transformer is connected to a load of 6 KVA and 0.8 P.F at 2200 Volt. Determine The Primary and Secondary currents.

 Answers: The Primary (IP ) = 27.27 ; The Secondary (Is ) = 2.727 A