**Worksheet-11**

**(Transformers)**

1. An ideal transformer with a 300-turn primary connected to a 480 V, 60 Hz supply line needs to output 120 V from the secondary. If a 100 Ω resistor is connected across the secondary, determine: A) How many turns the secondary must have to output the desired voltage. B) The current through the resistor, C) The current drawn through the primary. D) The maximum flux in the core of the transformer **[75, 1.2 A, 0.3 A]**
2. The emf per turn of a single phase 10 kVA, 2200/220V, 50 Hz transformer is 10V. Calculate (i) the number of primary and secondary turns, (ii) the net cross-sectional area of core for a maximum flux density of 1.5T. **[220,22; 0.3 m2]**
3. A 25 kVA, single phase transformer has 250 turns on the primary and 40 turns on the secondary winding. The primary is connected to 1500 V, 50 Hz mains calculate (i) secondary emf (ii) primary and secondary current on full load (iii) maximum flux in the core. **[240 V; 16,667 A, 104.167 A; 27 mWb]**
4. A single-phase transformer has 350 primary and 1,050 secondary turns. The net cross-sectional area of the core is 55 cm2. If the primary winding be connected to a 400 V, 50 Hz single phase supply, calculate (i) maximum value of the flux density in the core and (ii) the voltage induced in the secondary winding. **[0.936T; 1200 V]**
5. A voltage v = 200 sin 314t is applied to the transformer winding in a no-load test. The resulting current is found to be i = 3 sin (314t – 600). Determine the core and parameter of no-load approximate equivalent circuit. **[133.42Ω; 77 Ω]**
6. A 50 Hz transformer takes 75 W input at 1.5A and 120V. If the primary winding resistance is 0.4-ohm, find the no-load power factor and Iron Loss in the transformer. **[0.417 Lag; 74.1 W]**
7. A 100 kVA, 2400/240 V, 50 Hz single phase transformer has an exciting current of 0.64A and a core loss of 700 W, when its high voltage side is energized at rated voltage and frequency. Calculated the components of no-load current and no-load branch parameters. **[0.292 A, 0.57 A; 8.22 kΩ; 4.21 kΩ]**
8. A 230 V/115 V single-phase transformer takes a no-load current of 2 A at a power factor of 0.2 lagging with low voltage winding kept open. If the low voltage winding is now loaded to take a current of 15 A at 0.8 power factor lagging find the current taken by high voltage winding. **[9.09 A]**
9. A single-phase transformer is rated at 40 kVA. The transformer has full-load copper losses of 800 W and iron losses of 500 W. Determine the transformer efficiency at full load and 0.8 power factor. **[96.1 %]**
10. A 100 kVA, 2000 V/400 V, 50 Hz, single-phase transformer has an iron loss of 600 W and a full- load copper loss of 1600 W. Calculate its efficiency for a load of 60 kW at 0.8 power factor. **[ 97.56%]**
11. Determine the efficiency of a 15-kVA transformer for the following conditions: (i) full-load, unity power factor (ii) 0.8 full-load, unity power factor (iii) half full-load, 0.8 power factor. Assume that iron losses are 200 W and the full-load copper loss is 300 W. **[96.77 %, 96.84%, 95.62%]**