

- 19 The ratio of turns of a single-phase transformer is 8, the resistances of the primary and secondary windings are  $0.85\Omega$  and  $0.012\Omega$  respectively, and the leakage reactances of these windings are  $4.8\Omega$  and  $0.07\Omega$  respectively. Determine the voltage to be applied to the primary to obtain a current of 150 A in the secondary when the secondary terminals are short-circuited. Ignore the magnetizing current.
- 20 A single-phase transformer operates from a 230 V supply. It has an equivalent resistance of  $0.1\Omega$  and an equivalent leakage reactance of  $0.5\Omega$  referred to the primary. The secondary is connected to a coil having a resistance of  $200\Omega$  and a reactance of  $100\Omega$ . Calculate the secondary terminal voltage. The secondary winding has four times as many turns as primary.
- 21 A 10 kVA single-phase transformer, for 2000 V/400 V at no load, has a resistances and leakage reactances as follows: Primary winding : resistance,  $5.5\Omega$ ; reactance ,  $12\Omega$ . Secondary winding: resistance ,  $0.2\Omega$ ; reactance ,  $0.45\Omega$ . Determine the approximate value of the secondary voltage at full load, 0.8 power factor (lagging), when the primary supply voltage is 2000 V.
- 26 A 230 V/400 V single-phase transformer absorbs 35 W when its primary winding is connected to a 230 V, 50 Hz supply, the secondary being on open circuit. When the primary is short circuited and a 10 V, 50 Hz supply is connected to the secondary winding, the power absorbed is 48 W when the current has the full-load value of 15 A. Estimate the efficiency of the transformer at half-load, 0.8 power factor lagging.
- 29 A single-phase transformer is rated at 10 kVA, 230 V/100 V. When the secondary terminals are open-circuited and the primary winding is supplied at normal voltage (230 V), the current input is 2.6 A at a power factor of 0.3. When the secondary terminals are short-circuited, a voltage of 18 V applied to the primary causes the full-load current (100 A) to flow in the secondary, the power input to the primary being 240 W. Calculate : (a) the efficiency of the transformer at full load, unity power factor; (b) the load at which maximum efficiency occurs; (c) the value of the maximum efficiency.