

Indian Institute of Technology Patna  
Department of Electrical Engineering  
EE280 - Electrical Machines  
Spring - 2022  
Quiz - I  
18 February 2022

There are 5 problems. They carry equal marks.

$$(5 \times 2 = 10)$$

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1. A three phase balanced  $RL$  load is supplied by a balanced three phase source with phase sequence RYB. A voltmeter reads 400 Volts between lines. An ammeter in one line reads 5 Amps. A wattmeter whose current coil is connected in the line R and the potential coil is connected between R and Y reads 1000 Watts. Find the total real power consumed by the load in watts.
  2. An inductor is designed with 500 turns coil wound on an iron core of  $25 \text{ cm}^2$  cross sectional area and with a cut of an air-gap length of 2 mm. The coil is connected to a 120 V, 60 Hz ac supply. Find the steady state current. Neglect coil resistance, core loss, core reluctance, leakage flux, and fringing.
  3. A 50 kVA, 2400/240 V transformer gives the maximum efficiency of 98 % at three fourths of the full load unity power factor. Find the percentage efficiency at half the rated load 0.8 power factor lagging.
  4. A 230/115 V, 1 kVA single phase transformer has 3% resistance and 4% reactance. Find the voltage to be applied on low voltage side when the transformer is delivering full load at 0.8 pf leading on the high voltage side with rated voltage across the load.
  5. A  $1\phi$  1 kVA 440/220 V two winding transformer has 96 % efficiency at the full load unity power factor. If it is reconfigured as a 660/440 auto transformer, what will be the efficiency of the auto transformer at the full load 0.8 power factor lagging?