Daffodil International University
Dept. of Electrical and Electronic Engineering
Spring 2025 | 0713-213: Energy Conversion I

Quiz - 1 19 February 2025 Full Marks: **20.0**

CO-1

1. **Prove** that – whatever the load conditions, the net flux in the core is approximately the same as at no-load. [3]
2. A single-phase transformer has 1000 primary and 480 secondary turns. The net cross-sectional area of the core is 850 cm^2. If the primary winding be connected to a 50-Hz supply at 1100 V, **calculate** (i) the peak value of flux density in the core (ii) the voltage induced in the primary and secondary windings. [3]
3. A single-phase transformer has 80 turns in secondary and 320 turns in primary. The no-load power factor is 0.1736 lagging and the magnetizing component of no-load primary current is 4.7 A. If the load component of primary current (I_2') is 35 A at 0.891 lagging, **determine** the no-load current (I_0) and the current delivers by secondary (I_2). [5]
4. **Draw** the phasor diagram of a resistively loaded transformer by considering both winding resistance and leakage reactance. [4]
5. A 20 kVA, 2400/220 V, 50 Hz transformer has a high-voltage winding resistance of 0.15 Ω and a leakage reactance of 0.4 Ω. The low-voltage winding has a resistance of 0.05 Ω and a leakage reactance of 0.025 Ω. **Find** the equivalent winding resistance, reactance and impedance referred to the (i) high-voltage side and (ii) the low-voltage side and (iii) total Cu loss of the transformer. [5]

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1. **Prove** that – whatever the load conditions, the net flux in the core is approximately the same as at no-load. [3]
2. A single-phase transformer has 1200 primary and 500 secondary turns. The net cross-sectional area of the core is 900 cm^2. If the primary winding be connected to a 50-Hz supply at 800 V, **calculate** (i) the peak value of flux density in the core (ii) the voltage induced in the primary and secondary windings. [3]
3. A single-phase transformer has 100 turns in secondary and 420 turns in primary. The no-load power factor is 0.1736 lagging and the magnetizing component of no-load primary current is 3.8 A. If the load component of primary current (I_2') is 35 A at 0.891 lagging, **determine** the no-load current (I_0) and the current delivers by secondary (I_2). [5]
4. **Draw** the phasor diagram of an inductively loaded transformer by considering both winding resistance and leakage reactance. [4]
5. A 15 kVA, 2500/220 V, 50 Hz transformer has a high-voltage winding resistance of 0.18 Ω and a leakage reactance of 0.45 Ω. The low-voltage winding has a resistance of 0.045 Ω and a leakage reactance of 0.035 Ω. **Find** the equivalent winding resistance, reactance and impedance referred to the (i) high-voltage side and (ii) the low-voltage side and (iii) total Cu loss of the transformer. [5]