



Daffodil International University
Department of Electrical and Electronic Engineering
Faculty of Engineering
Mid-Term Examination, Fall – 2025

Course Code: 0713-213
Section: A, B, C, D, E
Full Marks: 25

Course Title: Energy Conversion I
Level-Term: L2-T1
Exam Date: October 11, 2025

Teacher's Initial: DRA, BS
Time: 1.5 Hours

Attempt to Answer all 4 Questions

- Q1. a) Derive the EMF equation of a single-phase transformer with supporting diagram. CO-1 3
C(2)
- b) A single-phase transformer has a primary winding of 1000 turns and a secondary winding of 280 turns. The load current on the secondary is 60 A at pf 0.707 lagging and the primary current is 30 A at pf 0.85 lagging. Determine the no-load current and the no-load power factor of the transformer. CO-1 4
C(3)
- Q2. a) "Whatever the load conditions, the net flux passing through the core is approximately the same as at no-load"- Justify the statement with necessary figures. CO-1 3
C(2)
- b) A 50 kVA, 4,400/200-V, 50-Hz transformer has a high voltage winding resistance of 0.12 Ω and a leakage reactance of 0.222 Ω . The low voltage winding resistance is 0.035 Ω and the leakage reactance is 0.012 Ω . CO-1 4
C(3)
- i) Determine the equivalent winding resistance, reactance and impedance referred to the high voltage side and the low-voltage side.
- ii) Calculate the total Cu loss of the transformer.
- Q3. a) Sketch the vector diagram of a transformer connected at lagging load considering both winding resistance and leakage reactance. CO-2 2
C(3)
- b) Find the equivalent circuit parameters of a 10 kVA, 240/400 V, 50 Hz, single-phase transformer was tested with the following results: CO-2 4
C(5)
- O.C. Test : 240 V, 1.2 A, 90 W – on LV side
- S.C. Test: 15 V, 4.7 A, 110 W – LV side is shorted
- Calculate the output secondary voltage of the transformer when delivering a load of 1 kW at pf 0.85 lagging and the primary is supplied at 240 V.

Q4. The following data refer to a single-phase transformer: Turn ratio 20 : 1; $R_1 = 30 \Omega$; $X_1 = 100 \Omega$; $R_2 = 0.08 \Omega$; $X_2 = 0.3 \Omega$. No-load current = 1.8 A leading the flux by 25° . The secondary delivers 200 A at a terminal voltage of 520 V and p.f. of 0.8 lagging. Determine the primary induced e.m.f and primary current. CO-2 5 C(3)

OR

A-100 kVA transformer has 450 turns on the primary and 80 turns on the secondary. The primary and secondary resistances are 0.35Ω and 0.01Ω respectively and the corresponding leakage reactances are 1.3Ω and 0.035Ω respectively. The supply voltage is 2100 V. Calculate (i) equivalent impedance referred to primary and (ii) the voltage regulation and the secondary terminal voltage for full load having a power factor of 0.9 leading. CO-2 5 C(3)